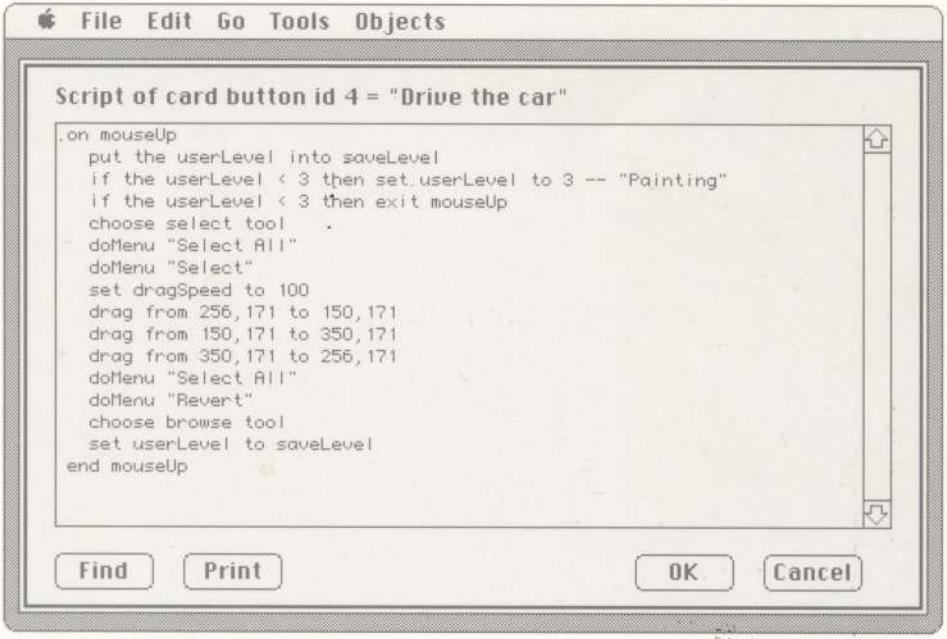
HyperTalk™ Beginner's Guide: An Introduction to Scripting


File Edit Go Tools Objects
Script of card button id 4 = "Drive the car"
on mouseUp
put the userLevel into saveLevel
if the userLevel < 3 then set userLevel to 3 -- "Painting"
if the userLevel < 3 then exit mouseUp
choose select tool
doMenu "Select All"
doMenu "Select"
set dragSpeed to 100
drag from 256,171 to 150,171
drag from 150,171 to 350,171
drag from 350,171 to 256,171
doMenu "Select All"
doMenu "Revert"
choose browse tool
set userLevel to saveLevel
end mouseUp
Find
Print
OK
Cancel

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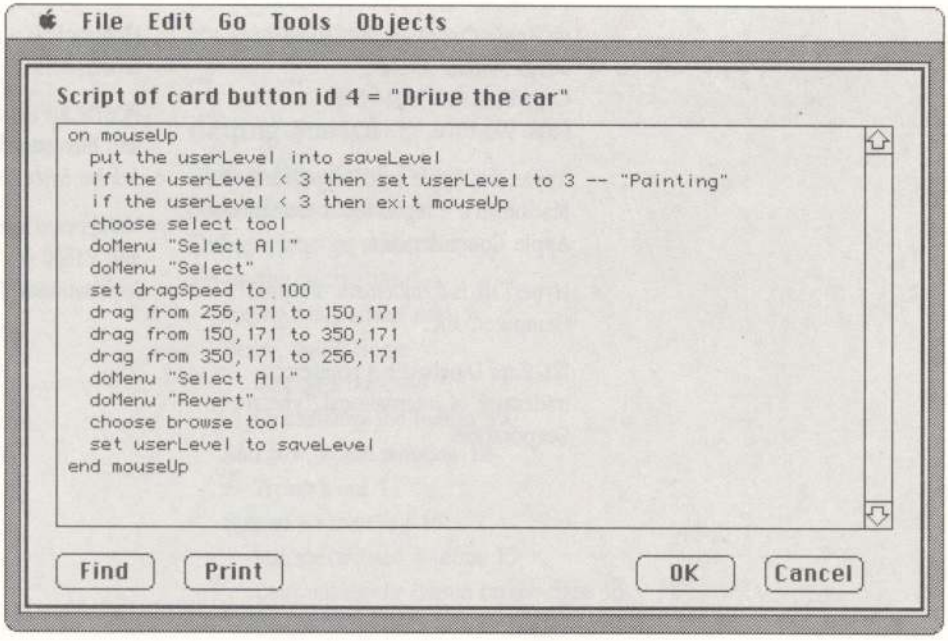
HyperTalk™ Beginner's Guide

An Introduction to Scripting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About This Guide

WELCOME TO THE *HYPERTALK BEGINNER'S GUIDE*. THIS GUIDE PROVIDES YOU with a starting point for exploring HyperTalk™, the language that's built into HyperCard® software. With HyperTalk, you can write your own instructions, called **scripts,** for HyperCard to carry out. Writing scripts is called **scripting.**

You can create, customize, and personalize HyperCard stacks without learning how to write scripts; but scripting with HyperTalk allows you even more control over what your computer can do for you.

If writing scripts sounds a lot like programming to you, you're right—they are very similar; however, you do not need *any* previous experience with programming to be able to write scripts. If you can read this paragraph, then you can write a script.

This guide introduces you to some basic scripting using a practice stack you create yourself. In this stack, you'll learn how to write scripts for traveling between cards, creating special effects, simulating animation, performing calculations, and more. Later on after you've completed this book, you can use your practice stack on your own as a place to try out new scripts.

What you need to know to use this guide

To get the most out of this guide, you should already know the basics of using your Macintosh® computer; for instance, how to use the mouse and the icons on the screen. You should also be familiar with how to get around in HyperCard. If you have gone through the first three or four chapters of the *HyperCard User's Guide,* you probably know enough to begin. Specifically, you should know how to use buttons to get around in stacks and how to use the HyperCard menus and tools. You should have browsed through some stacks, looked through part of the Help system, and perhaps personalized a stack—for example, you might have used the Address stack to store some information.

If you already have experience with programming in another language, you might want to go directly to the *HyperCard Script Language Guide.*

This guide is intended to help you get started and let you get a feel for scripting on your own. You won't find long, technical explanations of HyperTalk concepts here; but you will be able to see clearly how specific scripts work.

How to use this guide

Each chapter builds on what you've done in previous chapters, so it's important that you start at Chapter 1 and work through the book sequentially. You should be able to go through an entire chapter in a single session at your computer, but you can take a break any time you like—or keep right on going, if it suits you.

- In Chapter 1, "Getting Started," you'll create a practice stack, which you'll use for scripting throughout this book. You'll make buttons for the stack and complete their scripts.
- In Chapter 2, "Special Effects," you'll learn about visual and sound effects in HyperTalk and add them to your stack.
- In Chapter 3, "More About Messages," you'll explore how buttons and other objects receive and send messages.
- In Chapter 4, "Fields, 'It,' and Other Containers," you'll get an introduction to how HyperCard stores information and performs calculations.
- In Chapter 5, "Animation," you'll learn two ways to create "moving pictures" with commands.
- In Chapter 6, "Stacks You Can Build," you'll look at two examples of useful stacks that you could create and script yourself, starting with materials available in the Idea Stacks that comes with HyperCard.
- The Appendix, "HyperTalk Summary," contains a list of all HyperTalk commands, functions, and other elements.

You'll also find a glossary of terms, an index, and a Quick Reference Card containing all HyperTalk command and functions, which you can remove from this book and keep handy.

At the end of the book is a Tell Apple card. By answering the questions and mailing the card to Apple, you help us improve our products and documentation. Fill the card out after you've worked with this guide.

Conventions used in this guide

Several conventions are used in this guide to help make learning easier. The conventions are summarized here.

When a new term is defined, you'll see the term in **boldface.** New terms and other, related terms and definitions are included in the Glossary.

△ **Important** Material set off like this is especially worth reading. Information in these boxes advises you of noteworthy circumstances or helps you avoid misfortune. △

Sometimes definitions or cross-references appear in the margin.

❖ *By the way:* Paragraphs like this one contain additional information or interesting sidelights.

A special font (Courier) is used to show HyperTalk words and statements; it's also used to show any words or statements you should type. Courier font looks like this:

```
set userLevel to 5
```

Sometimes HyperTalk commands are shown in a generalized form, which is explained later in this book; for example,

`set` *property* `[of` *object*`] to` *value*

Words in italic are simply placeholders that would be replaced by some specific name or other value in an actual command. The square brackets `[]` are used to indicate optional parts; the brackets shouldn't be included in an actual command.

For more information

Because this guide is intended as an introduction for beginners, it is not comprehensive. HyperTalk comprises many commands, functions, keywords, and other elements that are not explained in this book.

The *HyperCard User's Guide* contains reference information for all menus and tools available.

The HyperCard Help system provides on-line help while HyperCard is running. The Help system contains a HyperTalk reference section.

The *HyperCard Script Language Guide,* published by Addison-Wesley Publishing Co. as part of the Apple Technical Library, is a complete reference to HyperTalk. It's intended for those with some programming or scripting experience.

The *HyperCard Stack Design Guidelines,* also published by Addison-Wesley, provides information on how to design and build professional-quality stacks. Its focus is the presentational aspect of stacks (for example, navigation methods and card layouts) rather than the mechanics of scripts.

Other excellent books on HyperCard and on HyperTalk scripting can be found in almost any bookstore.

CHAPTER 1

Getting Started

HAVE YOU EVER WANTED TO CREATE YOUR OWN SOFTWARE—MAKE AN application program that does things the way *you* want, rather than someone else's way? That's what HyperCard® software allows you to do.

This book takes you a step further into the power of HyperCard by introducing you to **scripting**—writing sets of instructions, called **scripts,** to customize HyperCard's actions. Everything that happens in HyperCard is directed by a script.

HyperCard scripts are written in the HyperTalk™ language, which is very much like the language people use in daily life. Believe it or not, you already know how to "say" things in HyperTalk—things that HyperCard would probably be able to understand and perform.

You do not need any prior experience with computer languages to use this book. You should, however, be familiar with HyperCard and know how to get around in stacks.

In this book, you'll practice scripting in a stack you'll build from scratch. Each chapter builds on material you've completed in previous chapters, so you should go through the chapters sequentially. In this chapter, you'll create the practice stack and write some simple scripts to control the actions of buttons.

Start up HyperCard

This book is meant to be used with HyperCard "up and running" on your Macintosh® system. You'll need to perform the steps as directed in the sections that follow to get the most out of the material.

So, first start up HyperCard as you normally would. (The *HyperCard User's Guide* has instructions if you need them.) If you already have HyperCard running, go to the Home card. You're ready to go on when you see the Home card on your screen (Figure 1-1).

■ **Figure 1-1** The Home card

Set your user level

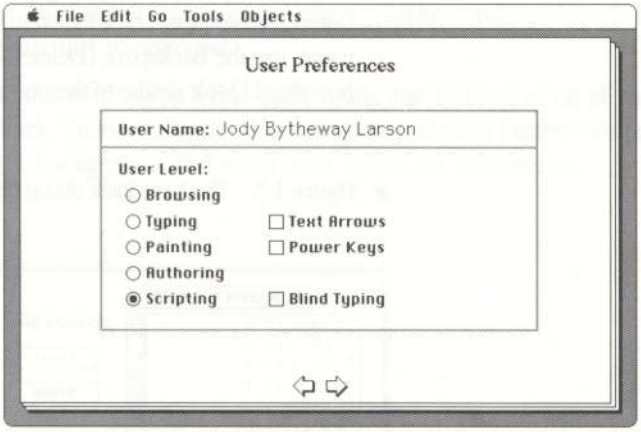
To work with scripts, your user level must be set at Scripting. Change the user level on the User Preferences card of the Home stack by following these steps:

1. **Click the left arrow at the bottom of the Home card to go to the User Preferences card.**

2. **Click the Scripting button.**

   For now, the check box options Text Arrows and Blind Typing should be unchecked. You won't need the Power Keys option either, but if you prefer to use Power Keys with the Paint tools you may. Figure 1-2 shows the User Preferences card with Scripting selected. (Earlier versions of HyperCard may not have the Text Arrows option.)

■ **Figure 1-2** The Scripting user level on the User Preferences card.



When the user level is set at Authoring or Scripting, a new menu title, Objects, appears in the menu bar. Commands in this menu allow you to get information about and change properties of HyperCard **objects**—buttons, fields, cards, backgrounds, and stacks. (You'll learn more about objects later on.) The user level must be set at Scripting before you can look at, write, or change these objects' scripts.

Create a practice stack

Now that you've set the user level to Scripting, the next task is to create a stack where you can experiment with scripts. You can make a new stack at any time from anywhere in HyperCard; you don't have to go back to the Home card. Just follow these steps:

1. **Choose New Stack from the File menu.**

   A dialog box appears in which you can name the stack and specify its background.

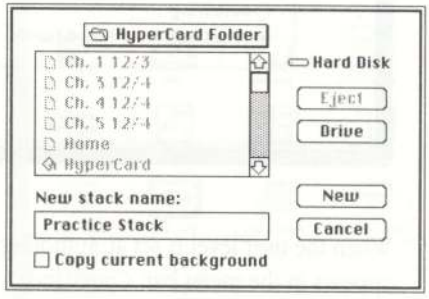
2. **Click the check box to remove the check mark from "Copy current background."**

   You don't want to copy the background for this practice stack, so "uncheck" the box. The new background will be completely blank.

3. **Type a name for the stack—for example,** `Practice Stack`

   In this book, your practice stack is referred to simply as that—but you can name your stack anything you like; "Practice Stack," "Test Stack," "Pilgrim's Progress," or whatever. If you make an error while typing the name, use the Backspace (Delete) key to erase it and retype. The dialog box should look similar to the one in Figure 1-3.

■ **Figure 1-3** The New Stack dialog box



4. **When you're ready, click New (or press Return).**

   You should see a completely blank card on your screen with only the menu bar showing along the top. This card is the first—and right now, the only—card of your practice scripting stack.

When you create a new stack, you automatically get three things: the stack itself, a background, and the first card. If you were to select the "Copy current background" option, you would also get the background pictures, fields, or buttons of the card you were on when you chose the New Stack command. Otherwise, as in this case, you have a blank card to work with.

Set up the background

You can think of the **background** in HyperCard as a kind of "holding area" for general elements. If a button, a field, or a picture is in the background, then it appears on every card that shares that background. Putting a button in the background, for example, allows you to have that button constantly available throughout a number of cards—you don't need to re-create it on every card. So far, the practice stack has only one background, so all cards you create will share that background.

In this section you'll first create a title that will appear on all cards of the stack. Then you'll put a Home button and some buttons for traveling into the background, and you'll write scripts for the buttons.

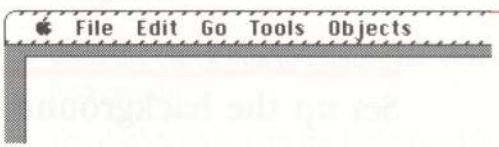
Before you go on,

- **Press Command-B to work in the background.**

  (You could also choose Background from the Edit menu.)

  The menu bar appears with striped lines top and bottom, indicating that you're working in the background (Figure 1-4).

- **Figure 1-4** Working in the background



- *Keyboard shortcuts:* The steps you follow throughout this book make use of a number of shortcuts for menu commands and for getting around in HyperCard. Some of these shortcuts may be new to you at first. You'll have plenty of opportunity to practice them.

Putting a title on the stack

It's a good idea to include a visible title or other identifier on each card of a stack, so you can always tell which stack you're in. Put a title on your practice stack using the steps that follow.

- *Are you in the background?* You should see stripes in the menu bar to indicate you're working in the background. If you don't see stripes, press Command-B.

The Paint Text tool

1. **Choose the Paint Text tool from the Tools menu.**

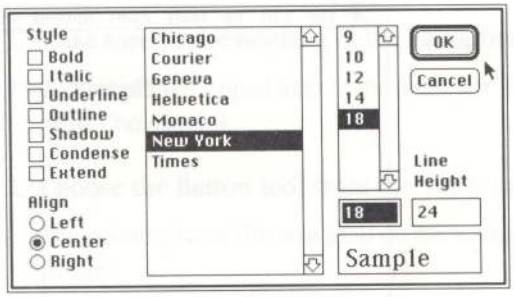
   If you prefer to work with a palette, you can turn the Tools menu into a palette by dragging past its bottom edge to "tear" it off the menu bar.

2. **Press Command-T to select the text style.**

   (You could also choose Text Style from the Edit menu or double-click the Paint Text tool on the Tools palette.)

   The Text Style dialog box appears (see Figure 1-5 for an example).

■ **Figure 1-5** The Text Style dialog box



3. **Choose a font you like in a large, readable size—for instance, New York 18.**

4. **Click the "Center" button in the lower-left corner of the box so that your text will be centered as you type it.**

5. **Click OK.**

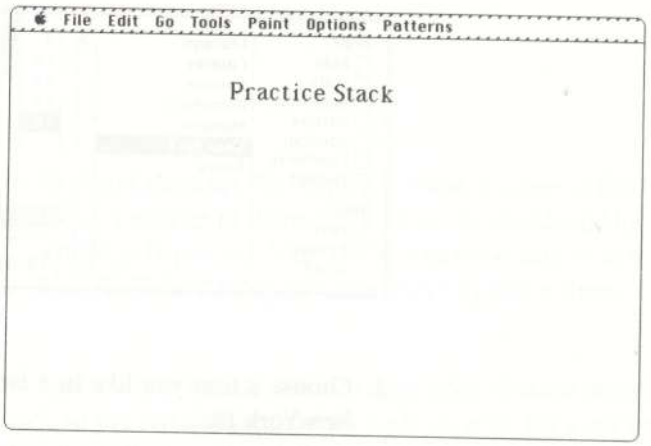
   You're ready to put the title on the stack.

6. **Click in the center of the card near the top to set the insertion point and then type the name of your stack.**

   Use the name you gave the stack when you created it. If you make a typing error, use the Backspace (Delete) key to delete and retype before clicking anywhere else. You can also just erase the name with the Eraser and start over.

   When you're finished, the screen should look something like Figure 1-6. All you've added so far is the title.

■ **Figure 1-6** The practice stack with a title



The name you typed into the New Stack dialog box when you created the stack is the name HyperCard uses to identify the stack. The title you added to the background is for convenience, so that you or other people can readily tell which stack it is.

Home, sweet Home

Whenever you see a small picture of a house in HyperCard, you can be pretty sure that clicking it will take you to the Home card. In the following sections, you'll add a Home button to your stack and complete its script.

❖ *By the way:* In the *HyperCard User's Guide* you learned how to copy and paste buttons with prewritten scripts, such as Home buttons. In this book, you'll complete the scripts yourself.

Making a button

You can always get a new button by choosing New Button from the Objects menu. In this book, you'll use a keyboard shortcut to make buttons. Follow these steps:

1. **Make sure you're working in the background.**

   You should see striped lines in the menu bar. If you don't see stripes, press Command-B.

The Button tool

2. **Choose the Button tool from the Tools menu.**

   The pointing hand (Browse tool) on the screen changes to an arrow pointer.

3. **With the pointer anywhere on the card, hold down the Command key.**

   Notice that the arrow pointer changes to a crosshair.

4. **While holding down the Command key, press the mouse button and drag to create a small square button about half an inch square.**

   Release the mouse button and the Command key when the button is about half an inch square. The new button is automatically selected—you can tell by the moving dotted lines around its edges. (This effect is sometimes referred to as "marching ants.") While it's selected you can change its size by dragging a corner or move it by dragging its center.

5. **Move the button to the lower-left corner of the card by dragging its center.**

   Because the button is in the background, it will appear in this position on every card in the stack, so you can always go Home.

Customizing the button

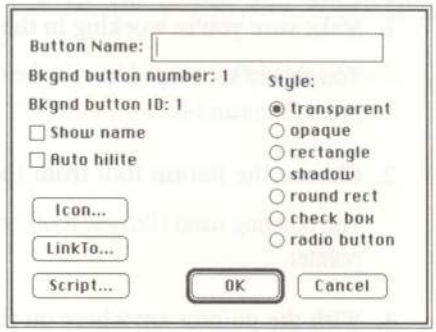
HyperCard buttons have a variety of styles and features from which to choose. You customize a button's appearance and actions through the Button Info dialog box.

1. **Double-click the button to see the Button Info dialog box.**

   (You could also choose Button Info from the Objects menu.)

   Figure 1-7 shows this box.

■ **Figure 1-7** The Button Info dialog box



Notice that the insertion point is blinking in the Button Name box, ready for you to type a name.

2. **Type `Home` (but don't press Return).**

   If you press Return prematurely, don't worry; just double-click the button again to get back to the Info dialog box.

3. **Click the "Auto hilite" check box to select it.**

   The "Auto hilite" option causes the button to become highlighted when it's clicked, which gives you a visual signal that you've clicked it.

   Leave the "Show name" option unchecked; you'll put an icon on this button instead.

4. **Click the Icon button.**

   Another dialog box appears in which you can select an icon for the button.

Some house icons

5. **Choose one of the house icons.**

   Scroll through the window until you find the house icons and click the one you want.

6. **Click OK.**

   All the dialog boxes disappear. Your new button now has the house icon on it.

Next, you'll write a script for this button.

And now, a little scripting

Scripts are created and changed in a special box called the **script editor.** To see the script for the new Home button:

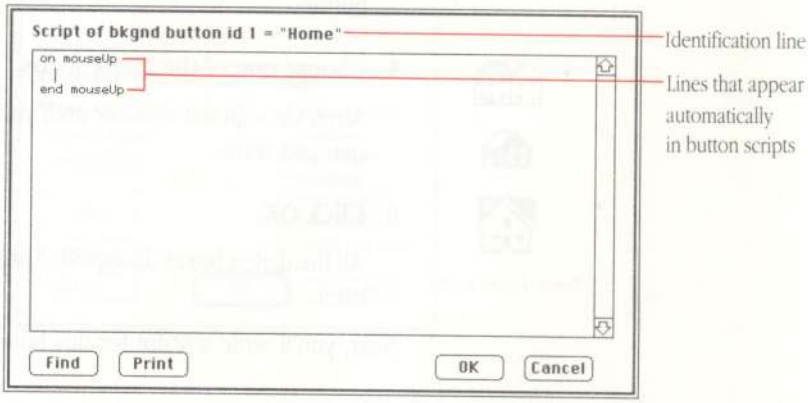
1. **Double-click the Home button.**

   You see the Button Info dialog box again.

2. **Click the Script button.**

   You see a large dialog box with two lines of text already in the window. This box is the script editor for the Home button. (See Figure 1-8.)

■ **Figure 1-8** The script editor



Notice that the top line identifies this script as "Script of bkgnd button id 1 = 'Home' "—your new button. Notice also that two lines of text appear in the box already—`on mouseUp` and `end mouseUp`—with the insertion point blinking in between. All scripts for new buttons have the first line and last line filled in for you.

The next step is to type the statement that defines the action of the button.

3. **Type** `go Home`

   The new line should appear between the existing lines. If you make a mistake, use the Backspace (Delete) key to erase and type over.

The three lines constitute the completed script for the Home button:

```
on mouseUp
  go Home
end mouseUp
```

As you might guess, these instructions describe what should happen when someone clicks the Home button. You have one more step before you're finished, but first, here's a brief description of how the script works:

Whenever you move the mouse, the Macintosh computer and HyperCard software track the movement electronically. You see the movement as a change in the position of the pointer on the screen. When you press and release the mouse button, electrical signals are sent, something like when you turn a switch on and off. The same thing is true when you press different keys on the keyboard. The HyperCard software interprets these signals from the system and translates them into HyperTalk **system messages.**

`MouseUp` is a system message that means the mouse button has been released; an on-screen HyperCard button receives this message when someone clicks it (that is, positions the Browse tool on it and then presses and releases the mouse button).

Whether something happens when the on-screen button receives the `mouseUp` message depends on whether the button's script contains any instructions for that message.

The first line, `on mouseUp`, signals HyperCard that further instructions exist. The lines that follow `on mouseUp` are HyperTalk statements that make up the instructions. The last line, `end mouseUp`, indicates the end of the instructions.

The word `go` is a HyperTalk command; it means what you might expect. `Go` must be followed by a destination—a description of a card or a stack. In this case, you used the name of the stack, `Home`. You could also have typed a more elaborate description that would mean the same thing, such as

```
go to card 1 of stack "Home"
```

Translated into English, the instructions say

"When this button is clicked, go to the first card of the Home stack. That's all."

To leave the script editor,

4. **Click OK.**

   The script editor disappears, and you're back to the practice stack. (If you click Cancel the same thing will happen, but your instructions won't be in the script.)

Trying it out

Now see if the Home button works as it's supposed to.

The Browse tool

1. **Choose the Browse tool from the Tools menu or palette.**

2. **Click the Home button.**

The next thing you see on the screen should be the Home card. Welcome Home!

If something else happened, such as a dialog box saying "Can't understand," then you might have made a typing mistake. Switch to the Button tool and double-click the Home button to check the script. Make sure everything is correct, and then click OK and repeat the steps.

To get back to the practice stack:

1. **Press Command-M to see the Message box.**

   (You could also choose Message from the Go menu.)

   The insertion point should be blinking inside the Message box, ready for you to type.

   If for any reason you previously typed something into the box, the earlier entry would still be there. Just start typing and the old text will be replaced.

2. **Type** `go to stack "Practice Stack"` **(use the actual name of your stack in quotation marks).**

3. **Press Return.**

   You should now see your practice stack on the screen.

   If something else happened, such as a dialog box asking you where the stack is, then check your stack name for correct spelling and completeness. For instance, if *Stack* is part of your stack's name, you'll have to include that word in the Message box.

4. **Close the Message box (click its close box or press Command-M again).**

As you see, you can use the `go` command both in scripts and in the Message box. Most HyperTalk commands work in both places; you can communicate directly with HyperCard through the Message box.

Buttons for traveling

Next you'll create two "travel buttons" to allow you to go back and forth between cards in the stack. (Right now there's still only one card, but you'll add more shortly.)

Making two new buttons

Use the same steps as you did for the Home button:

1. **Make sure you are working in the background.**

   You should see stripes in the menu bar. If you don't see stripes, press Command-B.

2. **Switch to the Button tool and use Command-drag to create two new transparent buttons.**

   Make them about the same size as the Home button.

3. **Position these two buttons side-by-side at the bottom of the card, roughly in the center.**

   Drag each button by its center to move it.

Customizing the button on the right

Make the button on the right into a "move forward" button:

1. **With the Button tool still selected, double-click the button on the right.**

   The Button Info dialog box appears.

2. **Name the button** `Next`

3. **Click the check box to select "Auto hilite."**

4. **Click the Icon button to see the available icons.**

5. **Choose an icon that points to the right.**

   You can choose any size arrow or pointing finger. Click the one you want.

6. **Click OK.**

   The boxes disappear. You should see the arrow or finger on the button.

Customizing the button on the left

Repeat the steps for the remaining button:

1. **With the Button tool still selected, double-click the button on the left.**

   The Info dialog box appears.

2. **Name the button** `Previous`

3. **Click the check box to select "Auto hilite."**

4. **Click the Icon button to see the available icons.**

5. **Choose an icon that points to the left.**

   It's best to use the same icon as you chose for the first button, but pointing the opposite way.

6. **Click OK.**

The two buttons should now have matching icons pointing away from each other.

Completing the scripts

You want the button on the right to take you to the next card in the stack and the button on the left to take you to the previous card. Put your instructions into the buttons' scripts:

1. **Hold down the Shift key and double-click the right-arrow button to see the script editor.**

   (You could also double-click the button and then click Script in the Button Info box.)

2. **Type** `go to next card` **between the existing lines.**

3. **Click OK.**

   The script editor disappears. Repeat the steps for the remaining button.

4. **Hold down the Shift key and double-click the left-arrow button to see the script editor.**

5. **Type** `go to previous card` **between the existing lines.**

6. **Click OK.**

You have now completed both buttons' scripts. The script for the button on the right contains

```
on mouseUp
  go to next card
end mouseUp
```

For the button on the left, it's

```
on mouseUp
  go to previous card
end mouseUp
```

These buttons can now be used to travel back and forth in the practice stack, card by card. Moving to adjacent cards isn't the only possiblity, of course; you can create other buttons to take you to any card of any stack you want by specifying in a script where you want to go.

So far in this stack, there's nowhere else to go. It's time to add some cards.

Fill out the stack

Before you add new cards, it's a good idea to label this card in some way so that you'll know when you're at the first card. Later in this chapter you'll learn a way to label other cards you add as well.

Adding a label field

First, create a text field in the background to hold the label. Follow these steps:

1. **Make sure you're still working in the background.**

   If you don't see stripes in the menu bar, press Command-B.

The Field tool

2. **Choose the Field tool.**

3. **Hold down the Command key and drag to create a new field about an inch and a half wide and roughly a quarter to half an inch high.**

4. **Move the field to the card's upper-right corner, beside the title.**

   Drag it by its center, just as you did with the buttons.

5. **Double-click the field to see its Info box.**

6. **Click "Rectangle" to set the field's style.**

7. **Click the Font button.**

   The Text Style dialog box appears.

8. **Select a font and size.**

   Geneva 12, which may be already selected, is a good choice.

9. **Click OK (or press Return).**

   The Text Style dialog box closes, and you're back to the card.

Typing a label

The field you created will appear on every card because you put it in the background. Text in the field, however, can be different on every card. Type a label for this card into the field:

1. **Choose the Browse tool.**

   Notice that when you choose the Browse tool, the stripes disappear from the menu bar. You are no longer in the background of the stack.

2. **Click inside the field to set the insertion point, and then type the words** `This is Card 1`

The text you just typed will appear only on this card; the field, however, will appear on all cards, and can contain different text in each card.

Adding five new cards

At last, you're ready to add some cards to this slim stack.

1. **Press Command-N five times.**

   (You could also choose New Card from the Edit menu five times.)

Although you haven't seen much happen on the screen, you've just increased the size of your stack from one card to six cards. Notice that the field in the upper-right corner is blank, indicating that you are no longer looking at the first card. You are on the last card you inserted, or the sixth card of the stack.

2. **Click the right-arrow button, and you should find yourself on Card 1 again.**

   Cards in stacks are arranged in a circle, so the first card is the next one after the last card.

A script to label all cards

You could label all cards in your stack by going to each one and typing its number into the field, just as you did for Card 1. But you can also write a script telling HyperCard to do it for you. Here's how:

1. **Choose Stack Info from the Objects menu.**

   The Info dialog box for the stack appears.

2. **Click the Script button.**

   The script editor for the stack appears. You can tell it's the stack script by the identifying line at the top.

3. **Type the lines that follow exactly as written. Press Return at the end of each line:**

```
on openCard
put "This is Card" && number of this card into field 1
end openCard
```

Be sure that you type two ampersands (&&) and that you include the quotation marks.

When you press Return after the final statement, you'll notice that the last line moves over to the left, but the middle line remains indented. This automatic indenting helps you check your scripts. `On` and `end` should always line up at the leftmost edge of the script editor box after you press Return the final time; if they don't, you might have left out something important and should check the script again. Pressing the Tab key also checks the formatting.

If everything looks correct,

4. **Click OK.**

The script editor disappears.

When you created the new cards, HyperCard numbered the new cards in sequence automatically. This script labels each card as you go to it by putting "This is Card" and the card's number into the field. Try it out:

5. **Click the right-arrow button to go to each card.**

You should see the phrase appear in the field automatically as you go, with the correct card number.

Just as the message `mouseUp` goes to a button when it's clicked, the message `openCard` is sent to the current card whenever you go to it. The `put` command does what you would expect—it puts something where you want it to go.

The double ampersand (`&&`) connects two pieces, or **strings,** of text together with a space in between. One piece of text is "This is Card" and the other piece is the card's number, which you specified as `number of this card`. If you wanted to join two strings of text together without a space, you would use a single ampersand.

In English, the script says:

"When a card opens, put the phrase "This is Card" and the card's number, with a space in between, into field 1. That's all."

All cards in the stack will be labeled by this script because it's a stack script. A stack script can have an effect on all backgrounds, cards, fields, and buttons belonging to that stack. You could have put the script at the card level, but you would have had to copy it to *every* card's script or it wouldn't work for every card.

The advantage of using a script to label cards is that you won't have to worry about labeling the cards yourself, even if you add or delete cards. HyperCard will take care of it for you.

Add a button to the Home card

Wouldn't it be convenient to have a button on the Home card that would take you directly to your practice stack? Create one now:

1. **Click the Home button to go to the Home card.**

2. **Choose the Button tool and create a new button.**

   Use Command-drag to create the button; make it fairly wide. Move it to any open space you have on the Home card.

   ❖ *By the way:* If you need room, you can move many of the Home card buttons just by clicking them with the Button tool and dragging them to a new location. (Some buttons are transparent; you have to move their underlying graphics separately.)

3. **Double-click the button to see its Info box.**

   You could also choose Button Info from the Objects menu.

4. **Name the button** `My Stack`

5. **Click "Show name" and "Auto hilite" to select them.**

6. **Click "round rect" to make the button style a rounded rectangle.**

7. **Click the Script button to see the script editor.**

8. **Type the command that will take you to your practice stack.**

   Can you do it? Give it a try. Here's a hint: you typed this command into the Message box earlier after testing your Home button.

9. **Click OK.**

   You should see the Home card with the new button. If the button is too small and you can't see all of the words, drag one of the button's corners to make it larger.

10. **Choose the Browse tool and click the My Stack button.**

If you went to Card 1 of your practice stack, congratulations!

If something else happened, then you might have misspelled a word or left out a space. If you got a directory dialog box asking where the stack is, you might have typed the name incorrectly.

Any of these statements would work in the button's script:

```
go to stack "Name"
go to "Name"
go "Name"
go Name
```

The placeholder word *Name* stands for whatever you named your stack when you created it. Be sure that you type the name exactly as it appears in the stack's Stack Info box.

△ **Important** Although it's possible in many cases to omit the quotation marks and still have a working statement, as a general rule it's best to include the marks. Without them, HyperCard is sometimes able to carry out the command the way you intend, but not always. Quotation marks remove any ambiguity. △

You should now be at Card 1 of your practice stack, ready to go on. Or, if you'd like to take a break, go ahead. In the next chapter you'll write some more elaborate scripts.

What you've done so far

In this chapter you've created a stack in which you can practice scripting in the rest of this book and on your own. You've completed scripts for three background buttons using the HyperCard script editor. Finally, you've created a background field and written a script to label all cards by number in that field.

Here's a list of the HyperTalk words you have learned:

Commands

`go` — This command is used to move from one card to another, within a stack or between stacks. The word `go` must be followed by the name of a card or a stack. `Go` works in scripts or in the Message box.

`put` — As you might guess, this command takes something and puts it somewhere. The word `put` must be followed by the name of the thing you want to put somewhere and the name of the place you want to put it.

Messages

`mouseUp` — A system message. When you click something, such as a button on the screen, the system sends `mouseUp` when the mouse button is released. (If the pointer is moved off the screen button before the mouse button is released, `mouseUp` is not sent.)

`openCard` — A system message sent to a card when it is opened.

Modifiers

`next` — This word means the same thing as the English word.

`previous` — Another word that means the same thing as the English word; it can be abbreviated `prev`.

Miscellaneous

`&`	(Ampersand) This symbol joins two pieces, or strings, of text together.
`&&`	(Double ampersand) This combination symbol joins two pieces of text with a space in between.
`end`	This word signals the end of a set of instructions. It must be followed by the name of a message, such as `mouseUp`. All HyperTalk scripts conclude with an `end` statement.
`on`	This word signals the beginning of a set of instructions. It must be followed by the name of a message, such as `mouseUp`.
`to`	The word `to` is used different ways in HyperTalk. It's optional with the `go` command; `go to stack "Scripting"` means the same as `go stack "Scripting"`.

CHAPTER 2

Special Effects

YOU MIGHT ALREADY KNOW THAT BUTTONS, FIELDS, CARDS, BACKGROUNDS, and stacks in HyperCard are called *objects*. More specifically, **objects** are HyperCard elements that can

- receive and send messages
- act on messages according to instructions in their scripts

Not all elements in HyperCard are objects. Elements that are not objects include any graphics or text you create with the Paint tools, the text inside fields, any dialog boxes that appear, the menu bar at the top of the screen, and the menus and palettes. The Message box is also not an object, even though you can send messages with it.

When you copy (or cut) and paste any object, its script goes along with it; thus, you don't have to build a button from scratch, as you did with the buttons in Chapter 1, every time you want one.

In this chapter you'll create more buttons and add some special effects to button scripts using new commands.

If you took a break and quit HyperCard at the end of Chapter 1, you need to start up HyperCard again. Use the button you added to the Home card to get to your practice stack. You're ready to go on when you see Card 1 of your practice stack on the screen.

Some visual effects

HyperCard's visual effects make movement between cards and stacks noticeable and visually interesting.

You add visual effects to scripts using the `visual` command. In the sections that follow, you'll add visual effects to your stack's buttons.

Right now, the practice stack is pretty bare visually, so visual effects won't be very effective. Let's add some graphics to the stack.

△ **Important** HyperCard visual effects aren't visible with color or with multiple grays selected. If you have been using color, go to the Control Panel (available in the Apple menu) and change the Monitors setting to "Black & White/Grays" and the number of grays to 2. △

Adding graphics

Using the Paint tools, you'll put a border on all cards to help you see some of the visual effects:

1. **Press Command-B to work in the background.**

   The menu bar becomes striped.

   Putting the border in the background means you'll have to draw it only once.

The Rounded Rectangle tool

2. **Choose the Rounded Rectangle tool from the Tools menu.**

   The Browse tool changes to the crossbar pointer.

3. **Choose Line Size from the Options menu to see the Line Size dialog box.**

4. **Click the line size you want. Choose one of the wider sizes.**

   The Line Size box closes automatically when you select a size.

The Line Size box

5. **If you want to make a patterned border, choose a pattern from the Patterns menu.**

   If you don't choose a pattern, the border will be a black line.

6. **Hold down the Option key, position the crossbar inside the upper-left corner of the card, and drag to the lower-right corner. Then release the mouse button.**

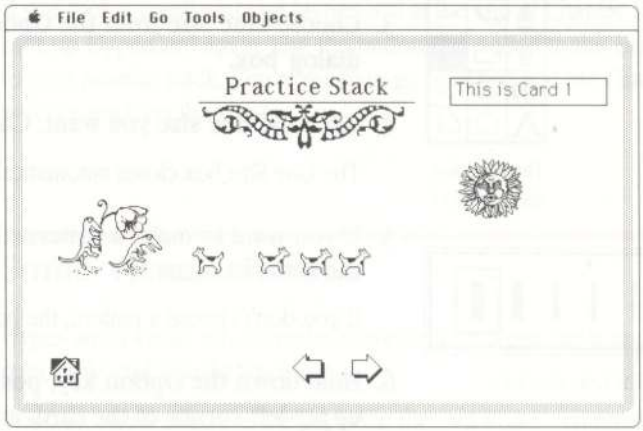
   Using Option-drag draws the rectangle with the selected pattern. If you didn't choose a pattern, you don't need to use the Option key.

   If you don't like the position of the rectangular border and want to try again, press Command-Z to undo the drawing before clicking anywhere else.

7. **Press Command-B or choose the Browse tool to stop working in the background.**

You can add some of your own graphics at the card level if you like; however, leave cards 4, 5, and 6 blank. You'll need to draw on them later in this book. Figure 2-1 shows a sample Card 1 with the background border completed and some optional, whimsical graphics added to the card. (The graphics were copied and pasted from the Art Ideas stack.)

■ **Figure 2-1** Sample Card 1 with graphics



The card border you added to the practice stack is only for the purpose of being able to see certain visual effects; cards do not necessarily have to have borders. If you were creating a stack for some other purpose, you would want to consider the card layout and inclusion of graphics carefully. For information on designing stacks, see the *HyperCard Stack Design Guidelines*.

The Visual command

Visual effects are most commonly used during transition between cards. In this section you'll add effects to the arrow buttons and to the buttons that take you back and forth from your stack to Home.

Adding effects to the arrow buttons

From any card in your practice stack, follow these steps to add a visual effect to the right-arrow button:

1. **Choose the Browse tool and then hold down the Command and Option keys.**

   Pressing these two keys lets you see the outline of all buttons on the card—even invisible (transparent) ones.

2. **Still holding down Command and Option, click the right-arrow button.**

   The script editor appears showing the button's script. (Release the keys after you click.)

   The Command-Option-click shortcut allows you to go directly to a button's script without switching to the Button tool first—a handy feature when you're doing a lot of scripting.

   (In versions of HyperCard earlier than 1.2, this shortcut doesn't work. An alternative is to switch to the Button tool and Shift–double-click the button.)

   ❖ *By the way:* Even though you had to switch to the background when you created this button, you do not have to switch to the background to change its script.

3. **Click before the word `go` to place the insertion point at the beginning of the second line.**

4. **Type** `visual effect scroll left` **and press Return.**

   The script should now look like this:

```
on mouseUp
  visual effect scroll left
  go to next card
end mouseUp
```

5. **Click OK.**

   The script editor disappears. The Browse tool should still be selected if you used the Command-Option-click shortcut.

To see how the visual effect works, watch the screen and click the button with the Browse tool. You should see the next card appear to slide in from the right.

6. **Add the same effect, but going the opposite direction, to the left-arrow button.**

   Follow the same steps as you did for the right-arrow button, but type

   `visual effect scroll right`

The `scroll` effect causes the entire screen image, including the background elements, to move in the direction indicated. It's good for giving a page-turning effect.

❖ *By the way:* Notice that you use `scroll left` for the *right* arrow and `scroll right` for the *left* arrow to simulate page turning.

Adding an effect to the Home button

This time you'll use a different effect:

1. **Press Command-Option and click the Home button.**

   (You could also use Shift–double-click with the Button tool selected.)

   The script editor for the Home button appears.

2. **Place the insertion point at the beginning of the second line, before the `go` statement.**

3. **Type this line and press Return:**

   ```
   visual effect wipe left slowly
   ```

   Remember to press Return so that the statement is on its own line, but don't click OK to close the script editor yet.

4. **Leave the script editor on the screen for now.**

The word `slowly` is a modifier that controls speed. You can choose from four options:

```
very fast
fast
slow[ly]
very slow[ly]
```

(The *-ly* is optional with slow.)

If you don't choose any of these, the effect runs at "normal" speed. The speed modifier should always follow the name of the effect.

Adding the same effect to the My Stack button on the Home card

Rather than type the command over again, you can just copy the command from the script editor of the Home button, which should still be on your screen.

(If you closed the script editor, press Command-Option and click the Home button to open it again.)

1. **Drag across the line with the visual effect as you would any text line to select it.**

   Make sure you select only the line with the visual effect.

2. **Press Command-C to copy the line.**

   The command statement is copied to the Clipboard.

3. **Click OK to save the script and close the script editor.**

4. **Click the Home button with the Browse tool.**

   The Home card appears. Notice the visual effect during transition—the wipe effect you just added. It's as though the first card is "wiped off" the next one.

5. **Command-Option-click the My Stack button to see the button's script editor.**

6. **Place the insertion point at the beginning of the second line, before the `go` statement.**

7. **Press Command-V to paste the visual effect.**

   You might also have to press Return to put the `go` command on a separate line after you paste.

8. **Click OK to save the script and close the script editor.**

9. Click the My Stack button with the Browse tool.

You should go back to Card 1 of the practice stack, seeing the wipe effect again.

Being able to cut and paste scripts can save you a lot of typing. You must use the keyboard shortcuts for Edit menu commands when you're using the script editor, however; the Edit menu is not available. Table 2-1 lists the script editor keyboard commands.

■ **Table 2-1** Script editor command summary

Key press	Action
Command-A	Select entire script
Command-C	Copy selection to Clipboard
Command-F	Find text (same as Find button)
Command-G	Find next occurrence of same text
Command-H	Find current selection
Command-P	Print selection or (if no selection) entire script (same as Print button)
Command-period	Close script without saving changes (same as Cancel button)
Command-V	Paste Clipboard contents at insertion point
Command-X	Cut selection to Clipboard
Enter	Close script and save changes (same as OK button)
Option-Return	Wrap line without return character ("soft" return—symbolized by ¬ in scripts. Don't use a "soft" return inside quotation marks.)
Return	Return character—indicates end of HyperTalk statement
Tab	Format script

More experiments with visual effects

You can make some test buttons on Card 1 of your practice stack to try out some of the visual effects. These test buttons will demonstrate the effects without your having to move to another card.

Here's a list of HyperCard visual effects:

```
barn door close/barn door open
checkerboard
dissolve
iris close/iris open
plain (same as no effect)
scroll down/scroll up
scroll left/scroll right
venetian blinds
wipe down/wipe up
wipe left/wipe right
zoom close/zoom open
zoom in/zoom out (same as zoom close/zoom open)
```

Some visual effects have a more noticeable effect than others, depending on the context. For example, the `scroll` effect creates a clearer transition than `wipe` does when only a few elements change from one card to another. `Wipe` is most effective when two cards have very different appearances. `Checkerboard` and `venetian blinds` can have an entertaining or humorous effect.

Barn Door

To try out the `barn door` effect, make a card button and write a script for it by following these steps:

1. **Create a new button.**

   You want this button on the card, so you don't have to switch to the background. Choose the Button tool, hold down the Command key, and drag. Make the button wider than it is high.

2. **Double-click the button with the Button tool to get to its Info box.**

   The Button Info box for the new button appears. Notice that this button is a card button, not a background button; it will appear only on Card 1.

3. **Name the button** `Barn Door`

   Its name will be the same as the visual effect it demonstrates when clicked.

4. **Select these options: "Show name," "Auto hilite," and "round rect."**

5. **Click the Script button to go to the script editor.**

   The insertion point should be blinking between `on mouseUp` and `end mouseUp`.

6. **Type these statements, pressing Return after the first two lines (but not after the last line):**

```
visual effect barn door close to gray
visual effect barn door open to card
go to this card
```

   ❖ *By the way:* The word `effect` is optional after `visual`. You can leave it out and the command will still work.

7. **Click OK to close the script editor.**

   If the name is too big for the size of the button, drag the corner of the button to make it larger.

8. **Choose the Browse tool and try out the new button.**

   You should see gray "doors" close and then open onto the same card. (This example is only one way to use the `barn door` effect; you don't necessarily have to pair the `open` and `close` versions.)

The `visual` command must be accompanied by a `go` command—the statement `go to this card` satisfies the requirement, even though it doesn't take you anywhere. (More specifically, it takes you to where you already are.)

The phrases `to gray` and `to card` determine the image HyperCard uses during transition. You can use any of the following words for the image:

`black`
`card` (the image of the destination card)
`gray` (or `grey`)
`inverse` (reverses the card image)
`white`

Dissolve

Create another button to test the `dissolve` effect:

1. **Create a new button and name it** `Dissolve`

   Follow the same steps and choose the same settings as you did for the Barn Door button.

2. **Click Script to see the script editor.**

3. **Type the following lines:**

```
visual dissolve slowly to black
visual dissolve slowly to white
visual dissolve slowly to card
go to this card
```

4. **Click OK, switch to the Browse tool, and try the button.**

   You should see the image fade to black, fade to white, and then fade to the card image.

When creating a stack for your own use or for others, you can combine a number of effects to give different visual impressions; for example, zooming in on a subject, turning pages, or changing the scene completely.

Create other test buttons on Card 1 as you like. Using `to black` or `to gray` as the image will help you see some effects more clearly.

The syntax of the Visual command

Syntax is a description of the way in which words are put together to form meaningful phrases. All languages—for people and for computers—have rules of syntax.

You've seen several versions of the `visual` command. Each version follows a certain general structure, which may include optional elements.

An expression of the general, underlying structure that a given command must follow is called its **syntax.** Knowing a command's syntax is as important as knowing its name and what it does; however, you don't have to try to memorize syntax just now; you can refer to this section whenever you need to.

Here's the syntax of the `visual` command:

`visual [effect]` *effectName* `[`*speed*`] [to` *image*`]`

Optional elements are shown enclosed by square brackets. (You do not include the brackets in an actual command.) Words in italic are placeholders: for example, in an actual command, you would replace *effectName* with any of the actual effect names: `barn door`, `checkerboard`, `zoom`, and so on. The same would apply for *speed* and *image*.

A statement's syntax shows you the correct order for elements in the statement; for example, if you were to write this command:

```
visual fast dissolve
```

HyperCard would not be able to understand the command because the *speed* element is in the wrong place. The correct order is

```
visual dissolve fast
```

HyperTalk syntax is much like English syntax, which makes HyperTalk an easy language to use. It's not always true, however, that a statement that makes sense in English will make sense in HyperTalk. Incorrect syntax will cause a "Can't understand" message; in such a case, check the statement's syntax if you find no spelling errors.

The Appendix and the Quick Reference Card both contain a list of HyperTalk commands showing their syntax.

Some sound effects

Two HyperTalk commands cause sound: the `beep` command, which causes the usual Macintosh system beep, and the `play` command, for adding other sounds and music.

△ **Important** To hear sounds, you must have the Speaker Volume in the Control Panel set to a value greater than zero. △

To use the `beep` command with a button, you would write a script like this:

```
on mouseUp
  beep
end mouseUp
```

You can cause multiple beeps by adding a number after the command, as in `beep 3`. If you don't add a number, you get a single beep. In Chapter 3 you'll use this command when you create an alert box.

The `play` command lets you add music to scripts; you can specify a number of notes with different pitches and time values and thus make a melody play, or you can use digitized sounds (sounds recorded in a digital format that computers can understand). Make a new button to try out the `play` command:

1. **Create a new card button on Card 1 and name it** `Sound`

   Use the Command-drag shortcut with the Button tool as usual. Bring up the Button Info box by double-clicking the button, type the name, and choose the "Show name," "Auto hilite," and "round rect" options.

2. **Click the Script button to see the script editor.**

3. **Complete the script by typing this line:**

```
play "harpsichord" "c c g g a a g"
```

Be sure to include the quotation marks with the instrument name and the series of letters representing notes. Also be sure to separate the letters with spaces.

4. **Click OK.**

Now try the button with the Browse tool. You should hear the first line of a familiar childhood tune.

The syntax of the Play command

The `play` command allows you to control pitch and tempo as well as voice. Here's the command's basic structure; refer to it as needed:

`play "`*voice*`" [tempo` *tempoValue*`] ["`*notes*`"]`

Voice is either `harpsichord` or `boing`, which are included with HyperCard, or the name of a digitized sound from some outside source.

You can optionally set the tempo (speed of play) by including the word `tempo` followed by a number (*tempoValue*). The value 100 is a medium speed; higher numbers play faster. If you don't specify a tempo, `tempo 100` is assumed.

Notes make up the melody sequence. (If you don't specify any notes, HyperCard plays a single note in the voice you specify.) You should include quotation marks around the voice and the notes. For example,

```
play "boing" tempo 200 "e4q d c d e e eh"
```

plays "Mary Had a Little Lamb."

Specifying the notes

Notes are represented by the letters A through G, corresponding to Western music notation. You don't have to capitalize the note names. You can include further modifiers after the note name, such as an accidental (a sharp or flat), an octave specification, and a duration code. Here's the syntax for a note:

noteName [*accidental*] [*octave*] [*duration*]

Accidental is either `#` for sharp or `b` for flat.

Octave is a whole number that specifies the pitch range. For example, `g#4` would be the G-sharp note in the middle range, or what musicians call the *middle-C octave.* Higher numbers give higher ranges, and vice versa. If you don't specify a number, HyperCard uses 4.

Duration is a letter code indicating how long to hold the note before the next note sounds. Here are the codes for note duration:

`w`	whole note (four counts)
`h`	half (two counts)
`q`	quarter (one count)
`e`	eighth (one-half count)
`s`	16th (one-fourth count)
`t`	32nd (one-eighth count)
`x`	64th (one-sixteenth count)

If you don't specify a duration code, HyperCard assumes a quarter note.

A period (.) after the duration code indicates a dotted note, which means a note with a duration value of half again as much; that is, `w.` would indicate six counts (four plus half of four). A numeral 3 after the duration code indicates a triplet.

The codes for octave and duration carry over to subsequent notes unless you change them; this feature saves you from having to type numbers and letters over and over. (See "Mary Had a Little Lamb," shown earlier.)

Here are some examples of notes with modifiers:

Note specification	Meaning
`d#5w`	D-sharp above high C held for four counts
`Bb4q`	B-flat above middle C held for one count
`e5h.`	E above high C held for three counts (because of the period after the duration code `h`)

Even if you have no formal music training and all these terms seem mystifying, you can still make melodies with the `play` command. The best way to gain an understanding of how to use the notes is to experiment with different notes and modifiers on your own. For instance, choose a short tune you already know and try to write it out. You can use the script for the Sound button you created earlier to test and change the tune until it sounds right to you—or create a new button.

Dealing with long lines

You can put a long sequence of notes into a script; however, the script editor doesn't wrap lines or let you scroll to see lines that extend beyond the window. You can press Return or Option-Return to wrap a long line temporarily while you type the notes; however, if you use this method you *must* delete the Returns to "unwrap" the lines when you're finished or the script won't work properly. The reason is that HyperCard doesn't understand a line break of any sort occurring inside quotation marks.

Another alternative is to wrap a long line permanently by inserting a closing quotation mark and the double ampersand (`&&`) followed by an Option-Return (¬):

```
on mouseUp
  play "harpsichord" "c c g g" &&¬
  "a a g"
end mouseUp
```

Notice that you must also begin the wrapped line with a quotation mark.

Just as at the end of the last chapter, you can take a break now if you want and come back sometime later. (The same is true for all chapters in this guide.)

What you've done in this chapter

In this chapter you've used HyperTalk commands to produce special effects: visual effects and sound. You've also added to your vocabulary list.

Commands

`beep`	Produces the system beep. You can cause multiple beeps by including a number: `beep 3`.
`play`	Causes notes to play. You specify the sound and the sequence of notes.
`visual [effect]`	Causes the visual effects you specify. It must be followed by the `go` command.

Names of sounds

`"boing"`

`"harpsichord"`

Names of effects

`barn door close/barn door open`

`checkerboard`

`dissolve`

`iris close/iris open`

`plain` (Same as no effect.)

`scroll down/scroll up`

`scroll left/scroll right`

`venetian blinds`

`wipe down/wipe up`

`wipe left/wipe right`

`zoom close/zoom open (zoom in/zoom out)`

Miscellaneous

`fast`	A modifier used with visual effects.
`slow[ly]`	A modifier used with visual effects.
`tempo`	A word that you use with the `play` command to control the timing of the notes.
`very`	A modifier used with `fast` or `slow`; it means "more."

CHAPTER 3

More About Messages

EARLIER YOU LEARNED ABOUT HYPERCARD SYSTEM MESSAGES—INFORMATION about system events such as clicks (`mouseUp`), keyboard actions, and events in HyperCard (`openCard`). System messages are sent constantly while HyperCard is running. There's even a message for when nothing is happening: `idle`. (See the Appendix for a list of HyperCard system messages.)

A script, as you've seen, can contain instructions to be carried out when a particular message is received—in other words, the script "handles" the message. Thus, a complete set of instructions that deal with a particular message is called a **message handler.** Message handlers always begin with the word `on` and end with the word `end`, and both words are followed by the name of whatever message the handler deals with; for example, `on mouseUp`.

An object's script might contain a number of handlers, each one handling a different message. Strictly speaking, then, the word **script** refers to everything that appears in the script editor for a given object, and not just to a single handler.

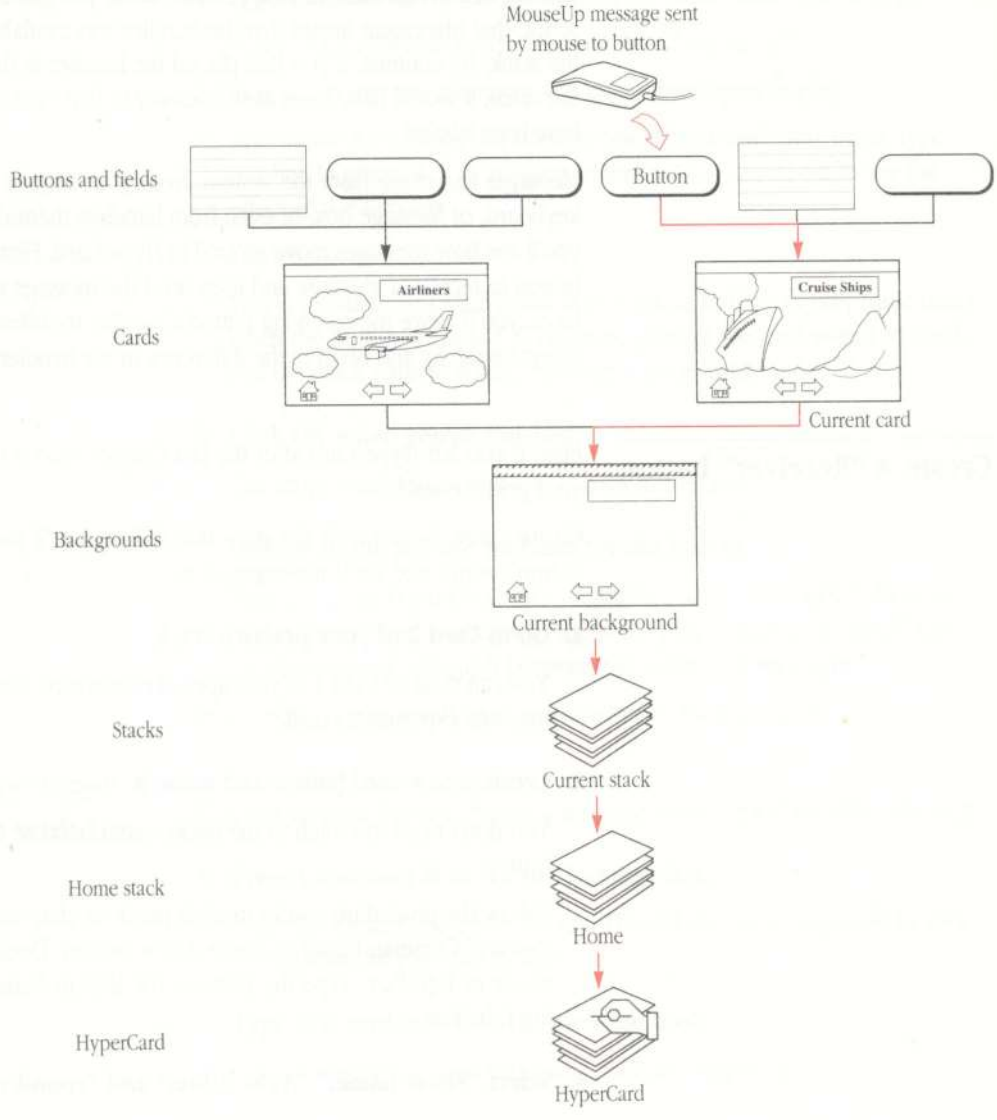
- *By the way:* `on` and `end` belong to a group of HyperTalk words called *keywords*.

In this chapter you'll write new handlers and explore the way messages travel between objects.

Sending messages

When someone clicks an on-screen button, the action generates a `mouseUp` system message. The `mouseUp` message always goes first to the button that was clicked. If that button's script doesn't have a handler for `mouseUp`, the message is passed to the card, then to the background, then to the stack, then to the Home stack, and finally to HyperCard itself. This sequence is called the **message-passing hierarchy** or the **object hierarchy;** it's illustrated in Figure 3-1.

■ **Figure 3-1** A message moving through the object hierarchy



You can place handlers at different levels. Where you place a handler has an effect on its availability. For example, in Chapter 1, when you wrote the handler to label all cards of your practice stack, you placed it in the stack script; that placement meant that the handler was available for every card in the stack. By contrast, if you had placed the handler in the script for one of the cards, it would have been available only to that card; no other cards would have been labeled.

Messages can come from the system, from your actions with the mouse, keyboard, or Message box, or even from handlers themselves. In this section you'll see how messages move around in HyperCard. First, you'll make a button to receive a message and then send the message to it in various ways. Later, you'll move the receiving button's handler to different levels in the object hierarchy and observe the difference in the handler's action.

Create a "Receiver" button

First, if you left HyperCard after the last chapter, start it up again and go to your practice stack.

Create a new button with the steps that follow; you'll put a handler into this button's script and send messages to it.

1. **Go to Card 2 of your practice stack.**

   You can think of Card 1 as your special effects card. Card 2 can be your message experiments card.

2. **Create a new card button and name it** `Receiver`

   You don't need to switch to the background because this is a card button.

   Follow the procedure you've used in previous chapters: use the Button tool and Command-drag to create a new button. Double-click the button to see its Info box. Type the name in the Button Name box at the top of the Info box.

3. **Select "Show name," "Auto hilite," and "round rect."**

4. **Click the Script button to see the script editor.**

5. **Type this line between** `on mouseUp` **and** `end mouseUp:`

```
play "harpsichord" tempo 80 "c4 e g"
```

As you can see, this statement will cause three notes to play.

❖ *Alternative for hearing impaired people:* If you can't hear notes, type this line in place of or in addition to the `play` statement to see the effect of the handler:

```
flash 3
```

This command causes the entire screen image to flash rapidly three times when the button is clicked. (The white parts of the card switch to black and the black parts to white; then they change back again.)

6. **Click OK when you're finished.**

The script editor closes and you're back to the card.

7. **Change to the Browse tool and try the button.**

Notice that the button becomes highlighted when you click it (because of the "Auto hilite" setting) and the notes play immediately. You'll use highlighting to distinguish between the sources of messages.

In the next section, you'll send `mouseUp` without clicking.

Send a message with the Message box

You can send the Receiver button a message using HyperCard's Message box:

1. **Press Command-M to see the Message box.**

You may see text in the box already. The old text will be replaced by new text as soon as you start typing.

2. **Type this sentence into the Message box:**

```
Send mouseUp to button "Receiver"
```

3. **Press Return.**

   You should hear the notes play immediately; but notice that the button does not become highlighted. (To send the message again, just press Return.)

The "Auto hilite" option causes a button to become highlighted when it's clicked. Because you sent `mouseUp` from the Message box and not by clicking, the button didn't become highlighted. The `mouseUp` handler still responds to the message, however, and the notes play.

4. **Click the close box to hide the Message box again when you're finished.**

You can send messages to specific objects from the Message box—and also from handlers—using the `send` keyword. Messages sent with `send` go directly to an object, bypassing the object hierarchy.

Create a "Sender" button

Follow these steps to make a button with which you'll send a message from inside a handler:

1. **Create another card button anywhere on the card and name it** `Sender`

   Use Command-drag with the Button tool selected to make the button, then double-click the button to see its Info box and type the name in the Button Name box.

2. **Select "Show name," "Auto hilite," and "round rect."**

3. **Click the Script button to see the script editor.**

4. **Type these lines between** `on mouseUp` **and** `end mouseUp:`

```
send mouseUp to button "Receiver"
wait 1 second
set hilite of button "Receiver" to true
wait 1 second
set hilite of button "Receiver" to false
```

5. **Press Tab to format the script if necessary.**

   `On mouseUp` and `end mouseUp` should line up at the left edge of the window; all the other lines should be indented.

In English this script says

"When this button is clicked, send a `mouseUp` message to the Receiver button. Wait one second, and then highlight the Receiver button. Wait one second, and remove the highlighting. That's all."

6. **Click OK when you're finished.**

7. **Change to the Browse tool and click the Sender button.**

   The Sender button becomes highlighted when you click it, because of its own "Auto hilite" setting. You should hear the notes play as the Receiver button responds to the `mouseUp` message. After a one-second delay, you should see the Receiver button become highlighted. After another second the highlighting disappears.

   If something else happened, check the Sender button's script for typing errors.

The Sender button's handler not only sends a `mouseUp` message to the Receiver button, but it also uses the `set` command to cause HyperCard to change the Receiver button's highlighting, and the `wait` command to create a one-second delay—a sort of "delayed reaction" effect.

The section entitled "Syntax Summaries" at the end of this chapter describes the syntax and uses of `set`, `wait`, and other commands you'll learn in this chapter.

The buttons and handlers you've made in this section demonstrate sending a message in three different ways:

- As a system message: When you click the Receiver button using the mouse, `mouseUp` is sent as a system message. The Receiver button becomes highlighted when you click it because you selected the "Auto hilite" option. The notes play (or the screen flashes, if you used that option) as indicated in the button's handler.
- As a Message-box message: When you use the `send` keyword in the Message box to send `mouseUp` to the Receiver button, the notes play as indicated in the button's handler, but because the button was not actually clicked, it doesn't become highlighted.
- From a handler: When you use the `send` keyword in the handler of the Sender button to send `mouseUp`, the Receiver button doesn't become highlighted right away because the button isn't actually clicked; but the notes play as indicated. Unlike the Message box, however, a handler can contain multiple commands to affect the Receiver button. In this case, you used the `set` command to change its highlighting and the `wait` command to create a delay.

The point is that there are lots of ways for a handler to "get the message." In the example you've just completed, the `mouseUp` handler in the Receiver button always responds to the `mouseUp` message, regardless of whether it comes from the system, the Message box, or another object's script.

Action at a distance

Where you place a handler in HyperCard affects its action. A handler at the "top" level, namely, in a button script or a field script, can respond only to a message received by that button or field. The same handler further "down" in the object hierarchy, at the card, background, or stack level, can respond to the message sent to any objects higher up, unless those objects intercept the message with their own handlers. (See Figure 3-1, earlier in this chapter.)

What the message-passing hierarchy means to you is that you can control whether your handlers act very locally, say, only for a particular button, or more globally, for an entire card, background, or stack.

In this section, you'll move the `mouseUp` handler of the Receiver button to different levels in the object hierarchy to experience the change in its response.

First, notice how the handler works only if you click the Sender button or the Receiver button. If you click anywhere else on the card, you won't hear the notes play. Furthermore, if you go to another card in the stack and click something, you won't hear the notes either. Try it out; when you're finished, go back to Card 2. The next step is to move the handler somewhere else.

Remove the handler from the button script

Follow these steps to cut the handler from the Receiver button's script, placing it on the Clipboard automatically:

1. **Press Command and Option and click the Receiver button with the Browse tool to see its script editor.**

   (You can also use Shift–double-click with the Button tool.)

2. **Press Command-A to select the handler.**

   Command-A selects the entire script, but in this case there's only one handler in the script.

3. **Press Command-X to cut the handler and place it on the Clipboard.**

   The script editor should now have nothing in it. If you still see the handler there, try steps 2 and 3 again.

4. **Click OK.**

   The script editor disappears and you're back to the card.

Every object has a script, even if there's nothing in it. Scripts with nothing in them are called **empty** scripts.

The script for the Receiver button is now **empty.** You can test it by clicking it with the Browse tool. You should see the Receiver button flash (because of "Auto hilite"), but hear no sound.

Move the handler to the card level

Now, you can paste the handler into the card's script.

1. **Choose Card Info from the Objects menu.**

2. **Click the Script button in the Card Info box to see the card's script editor.**

   The top line of the script editor tells you that it's the script for the card.

   ❖ *Keyboard shortcut:* You can press Command-Option-C to see the script editor of the current card without having to go through the Info box. (This shortcut doesn't work with HyperCard versions earlier than 1.2.)

3. **When you see the script editor, press Command-V to paste the handler.**

4. **Click OK.**

5. **Test the effects.**

   Switch to the Browse tool. First, click the Receiver button; you should see no difference in what happens: the button becomes highlighted and the notes play. The `mouseUp` message passes through the empty button script and goes on to the card script.

   Now, click the Sender button. Again, you should hear the notes, and then see the Receiver button become highlighted and then change back. The notes play because the `mouseUp` message from the Sender button also goes through the empty button script to the card script.

   And now, click anywhere on the card (except on another button or in the field). The notes play because whenever you click the card, `mouseUp` goes directly to the card, which now contains the handler for `mouseUp` in its script.

Move the handler to the background level

Take the handler out of the card script and move it to the background script:

1. **Choose Card Info from the Objects menu again and click Script to see the script editor.**

   Or, you can simply press Command-Option-C.

2. **Press Command-A to select the handler.**

3. **Press Command-X to cut the script and place it on the Clipboard.**

   The card script should now be empty.

4. **Click OK.**

5. **Choose Bkgnd Info from the Objects menu and click the Script button to see the background's script editor.**

   ❖ *Keyboard shortcut:* You can press Command-Option-B to see the script editor of the current background. (This shortcut doesn't work with HyperCard versions earlier than 1.2.)

6. **Press Command-V to paste the handler.**

7. **Click OK.**

8. **Test the effects.**

   Using the Browse tool, click the Receiver button, the Sender button, and the card, just as before. You should hear the notes play in every case. The `mouseUp` message goes through the empty Receiver button script and empty card script to the background script, which now contains the handler.

   Now, move to any other card in the stack and click any area except a button or field—you should still hear the notes play. The handler is now available to any card sharing the background.

If you moved the handler to the stack level, the same thing would happen because this practice stack has only one background; however, in cases where a stack has more than one background, only a handler at the stack level or above would be available to all cards of all backgrounds.

- *Other handlers intercept messages:* The reason you don't hear the notes if you click one of the travel buttons or other buttons besides Sender and Receiver is that those buttons already contain `mouseUp` handlers. Once a message is handled, it's not passed on unless you specifically pass it using the `pass` keyword.

Change the handler

If you were to leave the `mouseUp` handler where it is, in the background, you'd hear notes any time you happened to click somewhere other than a button. You can do one of two things: take the handler out of the background and move it back to the Receiver button; or change the handler's name from `mouseUp` to something else—in other words, change the handler so that it no longer responds to `mouseUp`, but to some other message. These steps show you how to do the second alternative:

1. **Open the script editor for the background by choosing Bkgnd Info from the Objects menu and then clicking the Script button.**

   Or, simply press Command-Option-B.

2. **Select the word `mouseUp` in the first line of the handler.**

   Drag across the word as you would when selecting any text—or just double-click the word.

3. **Replace it by typing the word `playTune`**

   `PlayTune` serves as the alternative name. You could use any other word (except a HyperTalk keyword); this name seems appropriate because it describes the action of the handler.

- *By the way:* If you are using the `flash 3` alternative instead of the notes, you could use a different name, such as `razzleDazzle` (but don't use `flash`). Be sure, however, that you use your alternative name in the steps that follow.

4. **Select the word `mouseUp` in the last line of the handler.**

5. **Replace it also by again typing the word `playTune`**

   The name used after `on` must match the name after `end`.

You have now changed the handler from a `mouseUp` handler to a `playTune` handler. It will no longer respond to the `mouseUp` message, but instead to the message `playTune`. But where does a `playTune` message come from?

The answer is that you'll put a new handler in the Receiver button's script. The new handler will send a `playTune` message:

6. **Click OK to save the handler and close the script editor.**

   You're back to the card again.

7. **Go to Card 2 (if you aren't already there).**

8. **Open the script editor for the Receiver button.**

   Use Option-Command-click with the Browse tool, or Shift–double-click with the Button tool.

   You should see the `on mouseUp` and `end mouseUp` lines already in the script editor. HyperCard always adds the lines to "empty" button scripts for your convenience.

9. **Type the following word between the two lines:**

   `playTune`

   The completed handler should look like this:

```
on mouseUp
  playTune
end mouseUp
```

10. **Click OK to save the handler and close the script editor.**

11. **Test the effects.**

    Clicking the Receiver button or the Sender button with the Browse tool should have the same effect as it did before you moved the handler. Sending `mouseUp` from the Message box to the Receiver button should also work the same. But clicking anywhere else on the card won't cause the notes to play, because the background handler isn't a `mouseUp` handler any more.

Now, when the Receiver button receives `mouseUp`, its handler in turn sends the message `playTune`. That message goes down the hierarchy until it's intercepted by the `playTune` handler in the background script. The `playTune` handler contains the command that plays the three notes.

Try this: go to some other card, open the Message box (press Command-M), type the word `playTune` and press Return. You'll hear the notes because the Message box sends the word as a message along the hierarchy until it reaches the background script.

(If you wanted to send `playTune` to some object not in the hierarchy, you would use the `send` keyword to specify the destination; otherwise, using just `playTune` alone is sufficient.)

Close the Message box when you've finished experimenting.

It's a new command

What you've done in this section is essentially define a new command, which is named `playTune`. The `playTune` command plays three notes. That's really all there is to defining your own commands: think of what you want a command to do, think of a name for it, and write a handler that uses the name after `on` and `end`, with the appropriate HyperTalk statements in between. Then, to make the command work, send the name as a message to the object that has the handler in its script.

- *By the way:* It's generally best to avoid using the name of an existing HyperTalk command or function as the name of a command you create. See the *HyperCard Script Language Guide* for details on naming commands.

Confirming actions

Sometimes it's useful to be able to put a message on the screen and get a confirmation for an action someone has taken. For example, the Macintosh system software gives you a chance to change your mind before erasing a disk by putting an alert box on the screen in which you confirm your choice. You can make your own alert boxes in HyperCard using a HyperTalk command. In this section you'll learn how to do it.

A disappearing act

Go to Card 2 of your practice stack if you are not there already; then follow the steps below.

1. **Switch to the Button tool and create a new button on Card 2; name it** `Disappear`

   Use Command-drag with the Button tool as before and double-click to see the Button Info box. Type the name in the Button Name box.

2. **Select the usual "Show name," "Auto hilite," and "round rect" options.**

3. **Click Script to see the script editor and type this line between the existing lines:**

   ```
   hide me
   ```

   The HyperTalk word `me` always refers to the object that contains the handler—in this case, the button itself.

4. **Click OK.**

5. **Switch to the Browse tool and click the Disappear button.**

When you click this button with the Browse tool, it . . . disappears.

To get the button back again,

1. **Press Command-M to see the Message box.**

2. **Type this statement and press Return:**

```
show button "Disappear"
```

❖ *By the way:* Once you've typed a statement into the Message box, it stays there until you type something else—even if the box is invisible. All you need to do to send the message to HyperCard again is to press Return.

You can use the `hide` command to make invisible a field, a button, a window (such as the Message box), the menu bar, the background picture (graphics in the background), or the card picture (graphics on the card that aren't in the background). The `show` command does just the opposite; you use `show` to reveal hidden elements.

Next, you'll create an alert box that will appear whenever you click the Disappear button.

A command to put up an alert box

Suppose you wanted anyone using your stack to think twice about making the button disappear. You can write a handler to make sure that happens:

1. **Open the script editor for the Disappear button.**

   Use Command-Option-click with the Browse tool or Shift–double-click with the Button tool.

2. **Click after the word `mouseUp` in the first line to place the insertion point, and then press Return to start a new line.**

3. **Type the following lines:**

```
beep
answer "Do you really mean that?" with "Yes" or "No"
if it is "Yes" then
```

4. **Click before `end mouseUp` to reposition the insertion point at the beginning of the last line.**

5. **Type this line and press Return:**

```
end if
```

Here's what the complete handler should look like:

```
on mouseUp
  beep
  answer "Do you really mean that?" with "Yes" or "No"
  if it is "Yes" then
    hide me
  end if
end mouseUp
```

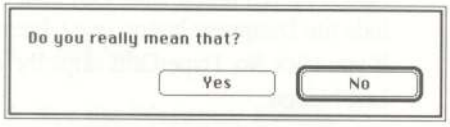
If you have extra blank lines, you can delete them, although they won't make a difference in how the handler works. Press Tab to format the script, if necessary (the lines indent automatically).

6. **Click OK.**

7. **Click the Disappear button with the Browse tool.**

When you click the Disappear button now, you should hear a beep and then see the alert box shown in Figure 3-2.

■ **Figure 3-2** The alert box you created with the Answer command



❖ *Something else happened?* If you get a "Can't understand" message instead, go to the button's script and check the typing. Make sure that no lines are left out and that the lines are in the correct order. Then try again.

In the alert box you have the choice of clicking a Yes button or a No button. These labels will be whatever you specify in quotation marks in the `answer` command statement. You can have up to three choices. Whichever choice you put last in order will be the button farthest to the right with the extra dark border; use this place for the the "best" or "safest" choice—the choice that can do no damage. This farthest-right button is also the one chosen by pressing Return or Enter.

8. Click No so the button doesn't disappear.

If you click Yes by mistake, just press Return; your message to show the button should still be in the Message box.

9. Go to the script editor for the Disappear button.

Use Command-Option-click with the Browse tool or Shift–double-click with the Button tool.

The handler includes directions for what HyperCard should do if the Yes button is clicked:

```
if it is "Yes" then
  hide me
end if
```

The word `it` refers to the label of whatever button you click. (The word `it` has a specific identity in HyperTalk; you'll learn more about `it` in the next chapter.) If you click Yes, then HyperCard follows the instructions to hide the Disappear button (`me`), because that's what the directions say to do. If you click No, HyperCard skips the instructions, so the Disappear button isn't hidden.

In English, the complete script says

"When this button is clicked, sound the system beep and let the user answer the question 'Do you really mean that?' by clicking either a button labeled 'Yes' or a button labeled 'No,' with 'No' being the emphasized choice. If the answer is 'Yes,' then make this button invisible. That's it, and that's all."

You can use a similar handler anytime you want to provide choices for yourself or other people using a stack.

An additional action

Every button can result in a different action. So far, you've specified an action for the "Yes" choice; next, you'll specify one for "No." The script editor of the Disappear button should still be on your screen.

1. **Click before `end if` to position the insertion point at the beginning of the next to last line.**

2. **Type the following lines (press Return after each line):**

```
else
answer "Glad you reconsidered." with "No problem"
```

The lines will automatically indent. When you press Return for the final time, `end mouseUp` should line up at the leftmost margin.

Here's how the completed handler should look in the Disappear button script:

```
on mouseUp
  beep
  answer "Do you really mean that?" with "Yes" or "No"
  if it is "Yes" then
    hide me
  else
    answer "Glad you reconsidered." with "No problem"
  end if
end mouseUp
```

If everything looks correct,

4. **Click OK.**

5. **Try the Disappear button.**

Now, when you click the Disappear button with the Browse tool you get the beep and the alert box just as before. Clicking Yes causes the button to disappear. Clicking No (the choice represented by `else`) makes another alert box appear with a gratuitous comment and reply—just for fun. (No further instructions are specified for the "No problem" button.)

If structures

`If`, `then`, and `else` are HyperTalk keywords that work together in specific arrangements called `if` structures. `If` structures are used to test things and to specify different actions, depending on the results. You included an `if` structure in the handler for the Disappear button:

```
if it is "Yes" then
  hide me
else
  answer "Glad you reconsidered." with "No problem"
end if
```

An `if` structure in HyperTalk is used much the same way as statements beginning with "if" are used in English. For example, in English you might say "If I am hungry, then I'll eat dinner." The phrase "I am hungry" is the thing being tested; if that's true, an action is specified, namely "I'll eat dinner."

`If` structures come in a few varieties; two of them are shown here. The first version is much like the structure you first used to hide the Disappear button:

```
if condition then
   action
end if
```

The placeholder word *condition* stands for the thing being tested. The word *action* stands for the instruction lines that follow if the condition is true. The last line, `end if`, signals the end of the instructions. Here's how the English example would look if it could be written in HyperTalk form:

```
if I am hungry then
   I'll eat dinner
end if
```

Another type of `if` structure specifies an alternative action to take if the condition is not true. It has this general form:

```
if condition then
   action
else
   anotherAction
end if
```

In this version, the placeholder word *anotherAction* stands for an alternative instruction line or lines. An example in English might be something like this: "If I am hungry, then I'll eat dinner; otherwise [else] I'll go to the movies." Here's how it would look if it could be written in HyperTalk:

```
if I am hungry then
   I'll eat dinner
else
   I'll go to the movies
end if
```

This structure is the one you used in the final version of the handler for the Disappear button.

`If` structures are useful anytime you want to make the action HyperCard takes dependent on some choice or condition. For more information on `if` structures, see the *HyperCard Script Language Guide* or other books on HyperTalk.

What you've done in this chapter

You've done a lot. You've learned about HyperCard's message-passing hierarchy and seen how placement of handlers can affect the range of their actions. You've also used the `if` structure—a useful structure for taking action in a specific case or condition.

See the following reference section, "Syntax Summaries," for the syntax of each command and for the send keyword.

Here are the terms you've added to your vocabulary:

Commands

`answer`	Puts a box on the screen containing a question and up to three response buttons.
`flash`	Causes the card image to flash. It's an external command (sometimes called an **XCMD** for short) included with HyperCard. External commands are written in a language other than HyperTalk.
`hide`	Makes buttons, fields, windows, and pictures invisible.
`set`	Changes the value of HyperCard properties. (See the syntax section for this command for an explanation of properties.)
`show`	Causes hidden buttons, fields, windows, and pictures to become visible.
`wait`	Causes HyperCard to wait for a specified length of time or until some specific action occurs.

Keywords

`else`	A word used when you want to specify an alternative action in an `if` structure.
`end`	You first encountered this keyword in Chapter 1; it signals the end of a handler or structure.
`end if`	The last statement of an `if` structure.
`if`	The keyword that begins special structures called `if` structures.
`on`	You first encountered this keyword in Chapter 1. All handlers begin with `on`.
`send`	Sends messages to objects directly. It works in the Message box as well as in handlers.
`then`	A keyword used in `if` structures to mark the beginning of a list of actions to be carried out.

Properties

`hilite`	A button property; if its value is `true` the button is highlighted.

Miscellaneous

`it`	The place where the `answer` command puts the label of the button chosen.
`second`	A unit of time; you could also abbreviate it as `sec`.
`with`	A preposition; used in the `answer` command and some other commands.

Syntax summaries

This section describes the syntax (most generalized form) of the `send` keyword and each command you used in this chapter.

You don't have to try to memorize these statements; refer to them as needed when writing your own handlers.

Answer

The basic structure for `answer` is this:

`answer "`*question*`" [with "`*reply*`" [or "`*reply2*`" [or "`*reply3*`"]]]`

Question can be any statement you like—usually a question invites the user to answer. *Reply, reply2,* and *reply3* are the labels for buttons representing the choices. The quotation marks are required.

You can have as many as three different replies. If you don't specify a reply, HyperCard displays a single OK button in the box. The size limit for a reply is 13 characters, depending on the width of the characters.

The label of whatever button gets clicked is put into a special place named `it`. In the handler you wrote for the Disappear button, the action of the `if` structure evaluated what `it` was (that is, which button had been clicked). You'll learn more about `it` in Chapter 4, "Fields, 'It,' and Other Containers."

Hide

Here are the four structures of the `hide` command:

```
hide menuBar
hide windowName
hide object
hide picture
```

`MenuBar` is, obviously, the HyperTalk name for the menu bar. *WindowName* stands for the card window, one of the palettes (Tools or Patterns), or the Message box. Replace *windowName* with one of these names:

```
card window
tool window
pattern window
[the] message [box]
```

Object is the name or description of a button or field; for example, `background button 1`. *Picture* is either `card picture`, for all elements on the card level created with a Paint tool, or `background picture`, for graphic elements on the background level.

See also the section "Show" later on.

Send

The syntax of the `send` statement you used is

`send "`*messageName*`" [to` *object*`]`

The quotation marks around the name of the message aren't needed if the message is a single word, like `mouseUp`. *Object* is an identifier for any object, such as its number, ID, or name. If you use the name, you must enclose it in quotation marks.

`Send` directs a message to any object in the current stack or to another stack, but not to a specific object in another stack. The `send` keyword sends a message directly to the specified object, bypassing any other objects in the usual message-passing hierarchy.

Set

The general structure of the `set` command is

`set [the]` *property* `[of` *object*`] to` *value*

Property stands for a changeable characteristic of the HyperCard environment or of an object. For example, the user level is a property of HyperCard; the statement `set userLevel to 5` within a handler or typed into the message box would set the user level to Scripting (value 5). *Object* is an identifier for an object, such as its number, ID, or name.

What *value* is depends on the property. Some properties, such as `hilite`, have the values `true` or `false`. Others, such as `userLevel`, have numeric values. Still others—such as the `name` property of a button—have as their value a string of characters.

Examples of properties you can change using `set` are the button style, the name of any object, a pattern from the Patterns palette, and many others. A complete description of properties is beyond the scope of this book, but the Appendix contains a complete list of properties.

Show

The `show` command, like the `hide` command, has four versions:

`show menuBar`
`show` *windowName* `[at` *h*`,` *v*`]`
`show` *object* `[at` *h*`,` *v*`]`
`show` *picture*

See "Hide," earlier in this section, for a description of the placeholders. In the optional phrase `at` *h*`,` *v* the *h* is a number specifying horizontal location on the screen, and the *v* specifies vertical location. The two numbers are separated by a comma. This optional phrase lets you place the window or object wherever you want. If you don't include it, the window or object appears wherever it was before it was hidden.

Later on, in Chapter 5, you'll learn more about the horizontal and vertical screen coordinates.

Wait

The `wait` command can have any of three forms, depending on what you want it to do:

`wait [for]` *number* `[seconds]`

`wait until` *condition*

`wait while` *condition*

Number is a whole number. If you want seconds, you must add `second`, `seconds`, or the abbreviation `sec` or `secs`; otherwise, HyperCard uses ticks, which have a value of 1/60 second. No other measurements (such as minutes) can be used.

In the second and third forms, *condition* is some state that has the value `true` or `false`. In the second form the command waits until the condition has the value `true`. In the third form, the command waits while the condition has the value `true`.

CHAPTER 4

Fields, "It," and Other Containers

IN EVERYDAY LIFE, A CONTAINER IS SOMETHING YOU CAN PUT THINGS INTO. IN HyperTalk, a **container** is a place in the computer's memory where you can put something of value, such as text or numbers. You can then get whatever you have put into a container and use it elsewhere as needed.

In this chapter you'll learn about different kinds of containers, and you'll see how handlers can work with values in containers to do such things as calculations.

As in previous chapters, if you took a break, start up HyperCard and go to the practice stack before you go on.

Fields as containers

Fields are objects—they can receive and send messages and can have scripts. Fields are also containers. They usually contain text; specifically, regular (field) text rather than Paint text.

You already used a field as a container in Chapter 1, when you wrote the `openCard` handler to label the cards. Here's the handler (you can also see it on the screen if you open the script editor for the stack script):

```
on openCard
  put "This is Card" && number of this card into field 1
end openCard
```

This handler uses background field 1 to hold a string of characters made up of the text string "This is Card" and the card's number. Every time a card opens, this handler puts the same thing, but with a new card number, into field 1.

If you place a field in the background, it appears on every card sharing that background; but the text that field contains can be different on every card. An interesting feature of HyperCard is that even though a background field is the container for the text, the text itself remains with the card. This feature allows you to have card-specific text that appears in the same place and in the same style on each card, even though its content changes.

△ **Important** Deleting a background field deletes all the text for that field on all cards, even though the text "belongs" to the cards. Once the text is gone, you can't get it back.

HyperCard presents an alert box when you use the Cut or Clear commands on a background field so that you can reconsider. △

Although fields are used most often to contain text, they can also hold numbers (numeric values).

- *By the way:* Numerals can be interpreted either as numbers or as text, depending on what a handler does with them. For example, the handler that labels the cards takes the number of each card and combines it with a text string. In doing so, HyperCard treats the numeral as text rather than as a number.

A simple calculation

In this section you'll create some fields to hold numbers and then write a handler that uses those numbers to calculate simple interest on a one-year loan. The handler then will put the results—amount of interest, total amount of loan, and monthly payment—into other fields. No expertise with mathematics is required on your part!

Set up the fields

You'll need five fields as containers for the numbers. You'll make card fields instead of background fields because you don't need the fields to be on every card of your practice stack.

Creating the first field

Follow these steps:

1. **Close the Message box if it is still on the screen.**
2. **Go to Card 3 of the practice stack.**

   You can use this card for your "field work."

The Field tool

3. **Choose the Field tool from the Tools menu.**
4. **Hold down the Command key and drag to create a new field.**

   Make the field about an inch wide and a quarter to half an inch high.
5. **Move the field to the left of center on the card.**

   The location isn't too important now; later you can adjust it.
6. **Double-click the field to see its Info box.**

   Notice that this field is card field 1.
7. **Name this field `Amount` and select "shadow" as the field's style.**

8. **Click the Font button to see the Text Style dialog box.**

9. **Change the font size to 14.**

   This setting will make the numbers in the fields easier to read. The Line Height setting automatically changes to 18.

10. **Click OK.**

    The Field Info box closes; the first field should still be selected.

Copying and naming the other fields

Instead of creating new fields from scratch, you can just make copies. Be sure you make the copies in the order specified so you can keep track of which field is which.

1. **Position the pointer in the middle of the selected field, hold down the Option key, and drag to duplicate the field.**

   When you copy the field, HyperCard automatically identifies the copy as card field 2. When you release the mouse button, the second field is automatically selected.

2. **Position the copied field below the first one.**

   You can drag the field by its center the same way you would a button to get it in the right position.

3. **Double-click the field to see its Info box.**

4. **Name the field** `Rate`

   Type over the name of the first field, which is already highlighted in the Field Name box. All other settings are the same as the first field, which is just what you want.

5. **Click OK.**

   The Info box closes.

6. **Repeat the Option-drag procedure on card field 2 to create a third field.**

7. **Position the new field 3 on the right side of the card, with some space in the middle between it and the first two fields.**

   You can adjust the spacing in a moment after you've made all the fields.

8. **Double-click the field to see its Info box and name it** `Interest`

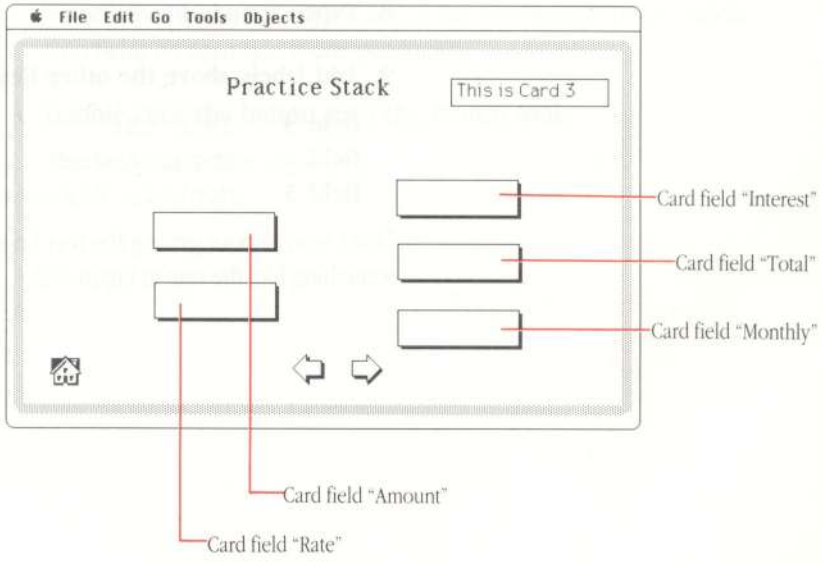
9. **Click OK.**

10. **Repeat the Option-drag procedure with field 3 to make a new field 4 below it; name this field** `Total`

11. **Repeat the Option-drag with field 4 to make a new field 5 below field 4; name field 5** `Monthly`

    Your screen should now look roughly like that in Figure 4-1. If you want to adjust the position of your fields, go ahead. Leave some room above each field so you can type a label. Don't be too concerned with precise placement—the important thing is the scripting practice coming up after the next section.

■ **Figure 4-1** The five new card fields



Labeling the fields on the card

Next, put Paint text labels above each field to help you identify their contents. Follow these steps:

The Paint Text tool

1. **Choose the Paint Text tool from the Tools menu.**

2. **Choose Text Style from the Edit menu to see the dialog box.**

   If you are using the menu torn off as the Tools palette, you can just double-click the Paint Text tool to see the Text Style dialog box.

3. **Select Geneva 12 and, if necessary, click the "Left" button in the lower-left corner of the box to align the text to the left.**

4. **Click OK.**

   The Text Style dialog box closes.

5. **Click just above the first new field to place the insertion point.**

6. **Type** `Amount`

7. **Click above card field 2, which should be the one below card field 1.**

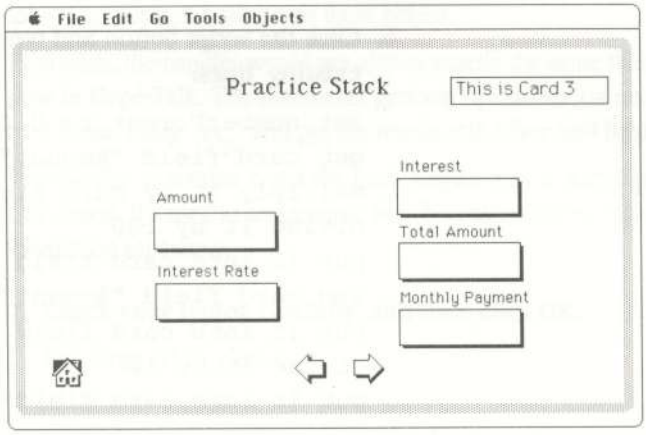
8. **Type** `Interest Rate`

9. **Add labels above the other fields as follows:**

   field 3 `Interest`
   field 4 `Total Amount`
   field 5 `Monthly Payment`

Don't worry about getting the text lined up exactly. The card should look something like the one in Figure 4-2.

■ **Figure 4-2** Paint text labels above the five fields



A calculating handler

Next, you'll create a Calculate button and put a handler into its script to make use of the fields for the interest calculation:

1. **Switch to the Button tool.**

2. **Command-drag to create a new button.**

   You can put the button anywhere you like on the card. In the middle with fields on each side is one possibility.

3. **Double-click the button with the Button tool.**

   The Button Info box appears.

4. **Name the button `Calculate` and choose "Show name," "Auto hilite," and "round rect."**

6. **Click the Script button and type these lines between the existing lines:**

```
set numberFormat to 0.00
get card field "Amount"
multiply it by card field "Rate"
divide it by 100
put it into card field "Interest"
add card field "Amount" to it
put it into card field "Total"
divide it by 12
put it into card field "Monthly"
```

The first thing this handler does is change the number format of HyperCard to "dollars and cents" (two places to the right of the decimal point). The number format is a HyperCard property aptly named `numberFormat`. The `set` command gives this property the value `0.00` (zeros, not letters), which specifies the standard dollars-and-cents format.

The `get` command fetches a value from a container—in this case, field 1, named "Amount"—and puts the value into another container named `it`. You first encountered `it` in the last chapter where the `answer` command used the container `it` as the place to put the label of a clicked button. (The button's label is a text value.)

`It` is a handy, ever-present container in HyperCard. You can often use this container's name in commands just as you might use the English pronoun *it* in a sentence, which makes the commands sound natural and easy to understand.

As you see, HyperCard can perform arithmetical operations using the value in the container `it`. The result of an operation with `it` always goes back into `it`, replacing what was there before.

In English, the handler would say almost exactly the same thing as it does now in HyperTalk. The statements perform operations on numbers from card fields, using `it`, and put the results into other card fields.

The handler as written is not the most elegant way to accomplish the calculation. It's used as an example here because it shows each step of the calculation separately.

7. **Check your typing carefully, and then click OK.**

   The script editor closes.

△ **Important** In HyperTalk you must use `card` or `cd` in front of `field` to specify a card field. If you leave out `card`, HyperCard assumes you mean a background field.

Conversely, you must use `background`, `bkgnd`, or `bg` in front of `button` to specify a background button, otherwise HyperCard assumes you mean a card button.

(The abbreviations `cd` and `bg` are not available in HyperCard versions earlier than 1.2.) △

Test the handler

The best way to see how the handler works is to try it by typing some values into the "Amount" and "Interest Rate" fields and clicking the Calculate button.

Let's say you want to know the interest, total amount, and monthly payments for a one-year loan of $8,000 at 16.5 percent annual simple interest.

1. **Choose the Browse tool.**

2. **Click inside the Amount field to set the insertion point.**

3. **Type `8000` for the amount $8,000.**

   Don't type the comma or the dollar sign—they will cause an error.

4. **Click in the Interest Rate field and type `16.5` for the interest rate.**

   Don't include a percent symbol.

5. **Click the Calculate button.**

Almost instantly, you should see numbers appear in fields 3, 4, and 5. Those numbers should be

Interest	1320.00
Total Amount	9320.00
Monthly Payment	776.67

- *Something else happened?* If you got different values, no values at all, or an alert box, check the script. Make sure that you haven't left out a line and that the handler is free of typing errors. Check that you have the fields labeled correctly (look at their Info boxes to verify their names). Also be sure that you haven't put a comma or dollar sign into the Amount field or a percent symbol into the Interest Rate field.

Try some other values for amount and interest rate. (You'll have to select and type over the numbers already in the Amount and Interest Rate fields.) Then click the Calculate button to see the new results.

The handler with comments

The following version of the handler shows comments that describe the action of the handler's statements. **Comments** are text lines typed into a script that are not part of the instructions. In HyperTalk, a comment must be preceded by two hyphens (--); the double hyphens indicate to HyperCard that the text following is a comment and should be ignored.

You do not have to type these comments into your own script; they are shown for example only.

```
on mouseUp
  set numberFormat to 0.00                -- Dollars and cents.
  get card field "Amount"                 -- The value in "Amount" gets put into It.
  multiply it by card field "Rate"        -- The result of the multiplication
                                          --     remains in It.
  divide it by 100                        -- Because field "Rate" is a percent.
  put it into card field "Interest"       -- The amount of interest.
                                          -- Note: The Put command puts only the VALUE
                                          --     of It into the card field. The Put
                                          --     command doesn't empty It.
  add card field "Amount" to it           -- Interest plus original amount.
  put it into card field "Total"          -- And the total amount is still in It.
  divide it by 12                         -- To get monthly payments for one year.
  put it into card field "Monthly"        -- The final action.
end mouseUp                               -- As always.
```

Comments typed into the script editor would not look as neat as those shown here. In this example, the comments have been formatted for readability.

Although HyperCard ignores comments, other scripters generally appreciate them. Adding comments to your scripts is an excellent way to document what your scripts do. Comments not only help other scripters understand what you've done, but also help *you* remember, when you look at old scripts long after you've written them.

Your comments don't have to be as elaborate as those in the example. In fact, the more clean and elegant your handlers are, the fewer comments you're likely to need.

Other containers

Other HyperTalk containers are the Message box, `the selection`, and variables.

The Message box

You can see the Message box anytime by pressing Command-M. It's called the Message box because you can use it to send messages to HyperCard or to objects, as you did in Chapter 3. You can also use the Message box to give a one-line command to HyperCard and to search for text.

The Message box is a single-line container. The `put` command uses the Message box as its destination if you don't specify any other container. For example, typing `card field 5` in the Message box and pressing Return would cause the contents of card field 5 to appear in the Message box; the same thing would happen if `put card field 5` were in a handler.

An **operator** is a character or group of characters that cause an operation, such as addition or subtraction, or an evaluation, such as comparison of two things. See the Appendix for a list of HyperTalk operators.

You can use the Message box as a calculator by typing numbers and arithmetic **operators** (`+`, `-`, `*`, `/`) into it—say, `350 - 62`. The answer, `288`, appears in the Message box when you press Return.

You can also type a HyperCard function into the Message box and press Return to see the value of that function. (See "A Few Words About Functions" near the end of this chapter for an example.)

The selection

Anytime you select regular text in a field by dragging across it, the part that appears highlighted (that is, the selection) is put into a container appropriately called `the selection`. The container `the selection` can be a destination for the `put` command; that is, you can use the `put` command to replace or add to selected text in a field.

- *By the way:* Text located using the HyperTalk `find` command isn't automatically selected, and therefore is *not* put into `the selection`. You can get the text located with `find`, however, by using the function `the foundText`.

Variables

A **variable** is something that can have any value you choose to give it. The values of variables change; by contrast, the values of **constants** are always the same. For example, `pi` is a HyperTalk constant having the value 3.14159265358979323846. You create a variable simply by thinking of a name for it (you can name it anything you like) and using the name with the `put` command. For example, in a handler you might have

```
put 16 into Ham -- "Ham" is the first variable name.
put 2 into Eggs -- "Eggs" is the second variable name.
put Ham+Eggs    -- Puts 18 into the Message box.
```

The name of a variable must start with a letter and can contain any combination of letters and numbers plus the underscore character (_), up to 29 characters maximum length. Operators or special characters can't be used.

You can use variables to streamline calculation handlers by making them more like formulas. Here's the first part of the handler for the Calculate button, using two variables, `Amt` and `Rte`, to figure the interest rather than using the `get` command and `it`.

```
set numberFormat to 0.00
put card field "Amount" into Amt
put card field "Rate" into Rte
put (Amt*Rate)/100 into card field "Interest"
```

Instead of using the `multiply` and `divide` commands, this version uses the arithmetic operators `*` and `/` to combine the variables on a single line. (See the section "Syntax Summaries" later in this chapter for more information on arithmetic commands.)

The container `it` is a variable. Some HyperTalk commands, such as `answer` and `get`, automatically change its value.

- *Local versus global:* The variables discussed here are **local variables;** that is, they and their values exist only within the handler in which they're created. HyperCard also has **global variables,** whose values are available to all handlers everywhere. Global variables aren't covered in this book. See the *HyperCard Script Language Guide.*

A few words about functions

HyperTalk contains both commands and functions. A **command** carries out an action, whereas a **function** produces a value of some sort. You can use names of functions in commands to get values, without having to figure out how to write out the formula as part of your handler. A few examples of built-in HyperTalk functions are

`average (`*list*`)`	Finds the average of a list of values. The values must be inside parentheses and separated by commas.
`compound (`*rate, periods*`)`	Finds the value of an account bearing compound interest.
`the date`	Gives the current date.
`the diskSpace`	Gives the number of bytes of free space.
`the mouseLoc`	Provides the location of the pointer on the screen.
`the sound`	Gives the name of the sound currently playing, or if no sound is playing, gives `"done"`

You can type a function into the Message box and get a value when you press Return. Press Command-M to see the Message box and type these functions:

```
the date
the time
the diskSpace
average (17,24,56,52)
```

(The answer should be 37.25.)

Some functions require the word `the`. For example, typing `date` by itself into the Message box won't work.

A thorough discussion of HyperTalk functions is beyond the scope of this book. The Appendix and the Quick Reference Card contain a list of all HyperTalk built-in functions.

What you've done in this chapter

In this chapter you've practiced using fields as containers for numbers and written a handler to perform a calculation. You've also learned about other HyperTalk containers, such as the Message box, `the selection`, and variables. You've also seen how comments are added to scripts using the double-hyphen (`--`).

Additions to your word list:

Commands

`add`	
`divide`	
`get`	Fetches a value and puts it into the variable `it`.
`multiply`	
`subtract`	

Prepositions

`after`	
`before`	
`into`	

Properties

`numberFormat`	A property of the HyperCard environment. You change it with the `set` command.

Containers

`it`	An all-purpose variable container used as a destination by some commands.
`the selection`	A container that automatically holds selected (highlighted) text.

Syntax summaries

This section contains syntax descriptions of the commands you used in this chapter. Use this section for reference as needed.

The arithmetic commands

The arithmetic commands are `add`, `subtract`, `multiply`, and `divide`.

`add` *expression* `to` *destination*

`subtract` *expression* `from` *destination*

`multiply` *destination* `by` *expression*

`divide` *destination* `by` *expression*

In all four commands, *expression* is something having a numerical value. *Destination* is a container.

HyperTalk also includes arithmetic operators that perform calculations: `+` (addition), `-` (subtraction), `*` (multiplication), and `/` (division). For example,

```
put 3 into it
add 7 to it
```

does the same thing as

```
put 3 + 7 into it
```

In both cases the result is 10 in `it`.

Get

The syntax of the `get` command is

`get` *expression*

Expression is a description of something having a value; it can be a text string or a number. Here are some examples:

```
get field 1
get the name of background button 3
get the userLevel
get 72+13 -- puts 85 into It.
```

`Get` puts the value of *expression* into `it`. In fact, these two commands are identical:

```
get field 1
```

```
put field 1 into it
```

In fact, anything you might want to do with the `get` command can probably be accomplished just as well with `put`. For example, the lines

```
get the date
put it
```

do the same thing as

```
put the date
```

Put

The syntax of the `put` command is

`put` *expression* [*preposition destination*]

Expression is a description of something having a value; it can be a text string or a number. *Preposition* is either `into`, `before`, or `after`. *Destination* is a container, such as `it`, a field identifier, or some other container. For example,

```
put 256 into card field 3
```

`Into` causes anything already in the destination container to be replaced by the expression. `Before` places the expression at the beginning of what's in the container (if anything), and `after` puts the expression at the end.

If you don't specify a destination, the expression is put into the Message box.

CHAPTER 5

Animation

WITH HYPERTALK, YOU CAN WRITE COMMANDS THAT RAPIDLY CHANGE THE images on the screen, creating animation effects. Animation combined with visual effects and sound can turn a presentation, a demonstration, or a training stack into an exciting multimedia production. In this chapter you'll explore two of the ways to animate images.

The first kind of animation involves using HyperTalk commands to manipulate graphics on a single card; the second kind uses different images on a number of cards, which are then shown in rapid succession.

If you took a break after the last chapter, start HyperCard again and go to your scripting practice stack.

Animation on a single card

In HyperCard, anything you can do with a menu command you can also accomplish with a HyperTalk command in a handler. You can achieve an animated effect by writing a handler to select a picture and cause it to move.

Make something to animate

The first step is to create a graphic image to animate. The one you'll make next is simple to do using the Paint tools. You might want to tear off the Tools menu and work with it as a palette so you can switch tools more easily.

Drawing a circle

Circles are easy to make with the Paint tools. Follow these steps:

1. **If the Message box is visible on the screen, close it by pressing Command-M or clicking its close box.**

2. **Go to Card 4 of the Scripting Stack.**

   Your first animation effect will take place entirely on this card.

The Oval tool

3. **Choose the Oval tool from the Tools menu (or palette).**

   The pointer changes to a crossbar. You'll use this tool to draw a circle on the card. First, you'll need to set the line width for the circle and set the Draw Centered option.

4. **Choose Line Size from the Options menu.**

   A small box appears with line width choices.

5. **Click the second width from the left.**

   The Line Size box closes automatically when you make the selection.

6. **Choose Draw Centered from the Options menu.**

   This option causes the circle to be drawn from the starting point outward when you drag, which makes it easy to center the circle on the card.

7. **Position the crossbar pointer near the card's center, hold down the Shift key, and drag until the circle is about three inches in diameter.**

   Holding down the Shift key makes a perfect circle.

8. **Release the mouse button when the circle is the right size. (Release the Shift key also.)**

   If you're not satisfied with your first attempt, you can press Command-Z to undo it and try again.

Make sure that the circle doesn't overlap or crowd any other pictures or decorations that you may have drawn on the card with the Paint tools. Use the Eraser to remove any graphics that come too close.

Drawing a smaller circle inside the first one

Next, you'll make a smaller circle inside the large one and then position it near the large circle's edge.

1. **Position the crossbar pointer inside the large circle, hold down the Shift key, and drag until the new circle is anywhere from three-quarters to an inch in diameter.**

   Release the mouse button and Shift key when the circle looks right. Don't click anywhere else when you're finished drawing it; go right on to the next step.

2. **Press Command-S.**

   Pressing Command-S selects the last thing you drew; in this case, the small circle. (You can tell it's selected because it's "shimmering.") The crossbar pointer changes to the Lasso.

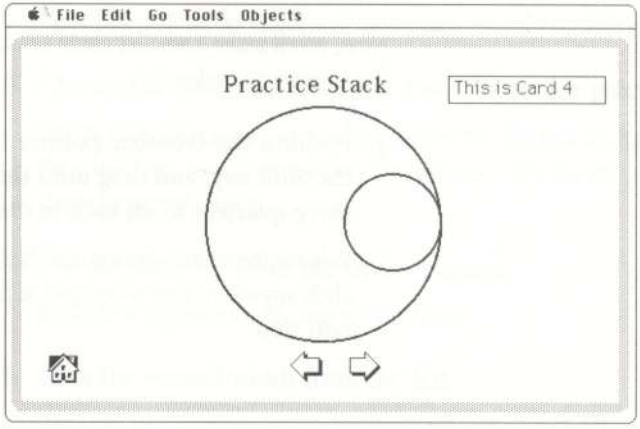
❖ *Didn't work?* If the smaller circle didn't get selected, just use the Lasso to encircle it—or switch to the Selection tool, drag across the circle, and then press Command-S to tighten the selection.

3. **Move the Lasso to the edge of the selected circle until it changes to the arrow pointer.**

4. **With the arrow pointer on the edge of the small circle, hold down the mouse button and drag the smaller circle until it touches the edge of the large circle.**

   See Figure 5-1 for an example of how the graphic should look. It's fine if your version has the smaller circle in some other location.

■ **Figure 5-1** The smaller circle inside the large one



Filling in the smaller circle

Now you'll fill the smaller circle with a pattern.

The Bucket tool

1. **Choose the Bucket from the Tools menu or palette.**

2. **Choose a pattern from the Patterns menu.**

   If you haven't chosen a pattern since you started up HyperCard, plain black will be selected.

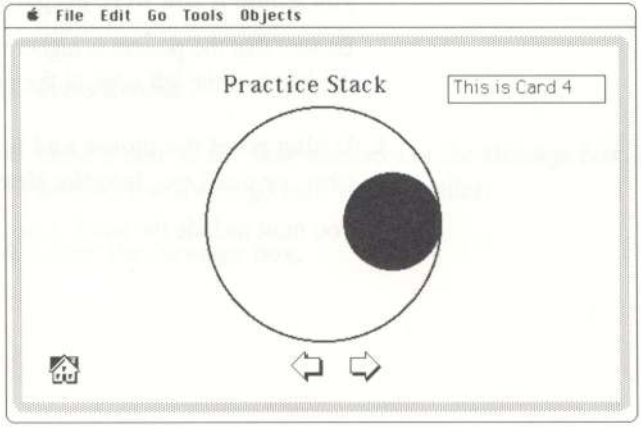
3. **Click inside the smaller circle.**

   The small circle should fill with the pattern you chose.

❖ *Everything changed?* If the paint "leaked out" and filled other areas besides the small circle, just press Command-Z to undo the paint job. Then you'll have to use the FatBits option to inspect the small circle for "holes" where the paint could leak through. Close any gaps using the Pencil, and then try using the Bucket again. See the *HyperCard User's Guide* for details on using the Paint tools.

The finished graphic should look approximately like that in Figure 5-2.

■ **Figure 5-2** The finished graphic image



Write a handler to use tools and menu commands

To cause this graphic to rotate, you could select it and choose Rotate Left or Rotate Right from the Paint menu. However, that action would rotate the image 90 degrees only once. To make it spin, you'd have to choose a Rotate command repeatedly. You can have HyperCard perform this action with a HyperTalk handler.

You can select the image from a handler by using the `choose` command to choose the Selection tool and then the `drag` command to drag across the image. But first, you need to know the starting point and ending point for dragging.

Finding the starting point

If you were going to drag across the image to select it, you would probably begin by positioning the pointer above and to the left of the image. That point would be your starting point.

1. **Press Command-M to see the Message box.**

2. **Choose the Button tool.**

   You'll make a button shortly; changing to the tool now just allows you to use the arrow pointer, which is easier to position, for the next step.

3. **Position the pointer to the upper left of the graphic image, as you would if you were preparing to drag across it.**

   Be sure that the pointer is higher than the top of the image and farther to the left than the left edge of the image.

4. **Letting go of the mouse and leaving the pointer where it is, type `the mouseLoc` into the Message box.**

   You must include the word `the`.

5. **Press Return.**

You should see two numbers in the Message box. The numbers represent the horizontal and vertical position of the pointer on the screen as measured from the top-left corner of the card window. The distances are measured in **pixels;** the value of the top-left corner of the screen is `0,0`.

Pixel is short for *picture element,* which is the smallest dot that you can draw on the screen.

`The mouseLoc` is a HyperCard function that tells you the current position of the pointer. As you learned in the last chapter, you can type HyperCard functions into the Message box to get their values.

6. **Make a note of these two numbers; you'll need to put them into your animation handler.**

Finding the ending point

You use similar steps to find the ending point for dragging:

1. **Position the pointer to the lower right of the graphic image.**

   Make sure the pointer is lower and farther right than the image. If necessary, move the Message box out of the way temporarily (drag it by the bar across the top).

2. **Leaving the pointer where it is, type `the mouseLoc` into the Message box.**

   Again, be sure to include `the`.

3. **Press Return.**

4. **Make a note of the new numbers in the Message box. These numbers will also go into your handler.**

5. **Close the Message box.**

Making a button and completing the handler

Next, create a button to hold the handler that will cause the animation:

1. **Create a new button and name it** `Spin`

   Choose the usual settings in the Button Info box.

2. **Click the Script button in the Info box to go to the script editor.**

3. **Type the following lines between the existing lines, substituting the numbers you made note of in the previous sections for the ones shown here:**

```
choose select tool
drag from 125,73 to 361,281 with commandKey
repeat for 16 times
doMenu "rotate right"
end repeat
choose browse tool
```

   When you type the line beginning with `drag`, be sure to substitute the numbers you got using `the mouseLoc` in the Message box. The first pair of numbers, the starting point for the drag, should follow the word `from`. The second pair of numbers, the ending point, should follow the word `to`. The phrase `with commandKey` has the same effect as dragging with the Selection tool while holding down the Command key: the selection is tightened to the perimeter of the image.

   `DoMenu` lets you choose any command from an available HyperCard menu. As with other names, it's a good idea to put the command name inside quotation marks.

4. **Press Tab to format the handler.**

   Here's how the handler should look, except for the numbers used with the `drag` command, which should be your own numbers:

```
on mouseUp
  choose select tool
  drag from 125,73 to 361,281 with commandKey
  repeat for 16 times
    doMenu "rotate right"
  end repeat
  choose browse tool
end mouseUp
```

   If you have any extra blank lines, you can select them and delete them. HyperCard just skips blank lines, however, when the handler is read.

5. **Click OK.**

   The script editor closes.

Trying it out

Switch to the Browse tool and click the Spin button.

You should see the circle turn through four complete rotations; that's because the `repeat` statement specifies 16 repetitions of the 90-degree Rotate Right command. If you had not specified a number, the image would just keep turning "forever."

In the Clip Art stack that came with HyperCard you'll find a picture of an old car with a button labeled "Drive the car." When you click the button, the car rolls forward and back. The script for that button contains a handler that selects the image and drags it back and forth, finally putting it back where it started. It's another example of animation using the Paint tools in a handler. Feel free to look at the button's script on your own.

Repeat structures

`Repeat` is a keyword that tells HyperCard to perform a command or series of commands over and over again. Like `if` structures, `repeat` structures come in several varieties; the first line of a `repeat` structure can have any of these general forms:

`repeat [forever]`

`repeat [for]` *number* `[times]`

`repeat until` *condition*

`repeat while` *condition*

`repeat with` *variable* `=` *startValue* `to` *finishValue*

You follow any of these first lines with a statement or list of statements making up the commands you want to have repeated. At the end, you must include `end repeat` to indicate the end of the list.

`Repeat` structures cause HyperCard to go around in a "loop," repeating steps until a particular endpoint occurs. Being able to use repeat structures saves you from having to retype or duplicate command lines over and over again. For example, without the `repeat` structure in the animation handler, you would have had to retype or copy and paste the line `domenu "rotate right"` 16 times to create the same effect.

The version `repeat [for]` *number* `[times]` lets you specify how many times HyperCard will repeat the commands; you replace *number* with the number of repetitions you want. You used this version in the animation.

The prepositions `until` and `while` specify different ways of looking at a situation. The *condition* is some state that has the value `true` or `false`.

The `repeat with` form causes repetition to continue until the value of a variable changes from a starting value to an ending value. For example,

```
repeat with count = 1 to 100 -- "count" is the variable.
  doMenu "rotate right"
end repeat
```

HyperCard adds 1 to the value of `count` after each rotation. This structure in the handler would cause the image to rotate 90 degrees 100 times, for 25 complete rotations.

Animation using several cards

Instead of changing the image on a single card, this next technique involves putting different images on sequential cards and then showing the cards rapidly.

Set up the cards

You'll use the same image in this version of animation. To get set up, you'll copy, paste, and turn the image on each of four cards.

Copying and pasting the image once

Follow these steps:

1. **Go to Card 4, if you aren't there already.**

The Selection tool

2. **Choose the Selection tool from the Tools menu or palette.**
3. **Drag to select the image on Card 4.**
4. **Press Command-S to tighten the selection**

   This step makes sure that you copy only the image you want, and not anything outside it.

5. **Press Command-C to copy the image.**
6. **Press the Right Arrow key to go to Card 5.**

   You can also press Command-3 or switch to the Browse tool and click the right-arrow button.

   ❖ *By the way:* If pressing the Right Arrow key doesn't work, try Option–Right Arrow. (You might have Text Arrows selected on the User Preferences card.)

7. **When Card 5 is on the screen, press Command-V to paste the image.**

   Card 5 will be the first card of the four cards needed for this type of animation.

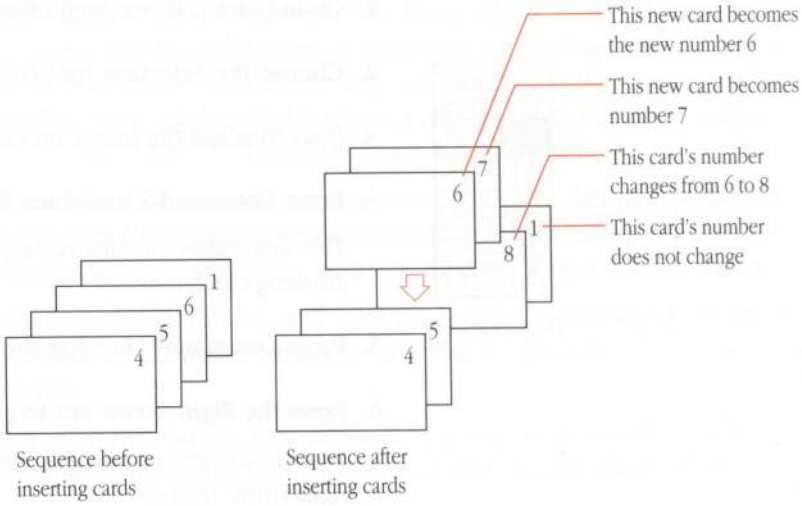
Adding more cards

You have only one more card in the stack at this point, and you need three more to use for animation:

- **Press Command-N two times.**

You should see "This is Card 6" appear in the label field the first time you press the keys, and "This is Card 7" the second time. HyperCard inserts each new card immediately after the card you were on; you end up looking at Card 7. The card that was the old Card 6 has been renumbered to become Card 8. Figure 5-3 illustrates the addition of new cards.

- **Figure 5-3** New cards inserted after the current card



Copying and pasting the image twice more

Put rotated copies of the graphic image onto the remaining cards following these steps:

1. **Press the Left Arrow key to go back to Card 6.**

   You can also press Command-2 or click the left-arrow button.

2. **Press Command-V to paste the image on Card 6.**

   The graphic image should still be on the Clipboard. If nothing happens, go back to Card 5, reselect the image, and use Command-C to copy it. Then paste it on Card 6.

3. **With the image still selected, choose Rotate Right from the Paint menu.**

   Each image needs to be rotated 90 degrees from the previous one to create the animation effect.

4. **Press Command-C to copy the rotated image.**

5. **Go to Card 7 and press Command-V to paste the image.**

6. **Choose Rotate Right from the Paint menu again.**

7. **Repeat steps 4, 5, and 6, but this time going to Card 8, to paste and rotate the image for the last time.**

When you're finished putting the images on the cards, go back to Card 5, where you'll create a button and write a handler to perform the animation.

Write a handler to show the cards

The handler for the animation will again go into a button script.

1. **Create a new button and name it** `Spin 2`

   Select the usual settings.

2. **Click Script to see the script editor.**

3. Type these lines between the existing ones:

```
repeat for 10
go to card 5
show 3 cards
end repeat
go to card 5
```

4. Press Tab to check the formatting of the handler.

Here's how the complete handler should look:

```
on mouseUp
  repeat for 10
    go to card 5
    show 3 cards
  end repeat
  go to card 5
end mouseUp
```

5. Click OK.

6. Try the button.

Choose the Browse tool and click the Spin 2 button. The image spins ten times and then stops. You'll see the numbers in the card identification field change and the Spin 2 button flash by each time you get to Card 5 (you'll fix this shortly). When the handler is finished, you should be on Card 5.

Notice that the animation is faster going card-to-card than it was on a single card. That's because in the first case HyperCard must redraw the image each time through the `repeat` structure, which takes some time.

Here's a commented version of the handler explaining what each line does:

```
on mouseUp
  repeat for 10  -- The number of times to repeat.
    go to card 5    -- Always start here.
    show 3 cards    -- Shows cards 6, 7, and 8.
  end repeat
  go to card 5      -- Back to the starting card.
end mouseUp
```

Another way to control the spin

You can add a "contingency plan" to your `repeat` structure that will give you another way to stop the image from spinning.

1. **Command-Option-click the Spin 2 button to see its script.**

   You could also switch to the Button tool and Shift–double-click.

2. **Click before the word `go` at the beginning of the third line of the handler to place the insertion point in front of `go to card 5`.**

   That's the line just after `repeat for 10`.

3. **Type this line and press Return:**

   ```
   if the mouse is down then exit repeat
   ```

4. **Click OK.**

5. **Try the Spin 2 button again, and this time press down the mouse button before the ten cycles have completed.**

   (You may have to hold the mouse button down for a half second—HyperCard might not detect a fast click.)

Now when you start the image spinning you can click anywhere to stop it before it spins ten times.

The line you added is a variation of the `if` structure. An `if` structure that has only one condition and only one action can be typed as a single line in your handler and doesn't require the `end if` line.

`Exit` is another keyword. `Exit repeat` jumps to the end of the structure (that is, to `end repeat`), stopping the repetition. Any instructions between `end repeat` and `end mouseUp` are then carried out.

Some finishing touches

Every time Card 5 appears during the animation, you see the Spin 2 button flash by. The numbers also change in the label field. Both these visual interruptions detract from the animation. Use the `hide` and `show` commands to remove the button and field temporarily while the animation is running:

1. **Command-Option-click the Spin 2 button to see the script editor.**

2. **Click before `repeat` at the beginning of the second line.**

   You want to add new statements before the `repeat` structure.

3. **Type these statements, pressing Return after each line:**

   ```
   hide field 1
   hide me
   ```

   `Me` refers to the object containing the handler (the button itself) and `field 1` is background field 1 (the label field).

4. **Click before `end` to place the insertion point at the beginning of the line `end mouseUp`.**

   You want to add the following statements after the `repeat` structure.

5. **Type these statements, pressing Return after each line:**

   ```
   show field 1
   show me
   ```

The entire handler looks like this:

```
on mouseUp
  hide field 1
  hide me
  repeat for 10
    if the mouse is down then exit repeat
    go to card 5
    show 3 cards
  end repeat
  go to card 5
  show field 1
  show me
end mouseUp
```

6. **Click OK.**

7. **Try the Spin 2 button.**

Click the Spin 2 button with the Browse tool. If there are no other graphics on cards 5 through 8, the effect should now be cleaner, showing only the turning symbol.

What you've done in this chapter

You've learned two ways to create animation: by using Paint tools and menu commands in a script, and by using the show cards command with a sequence of cards. You've experimented with the `repeat` structure, a way of performing a set of commands over and over again. You've also learned how to use the function `the mouseLoc` in the Message box to find the screen coordinates of the pointer.

Commands

`choose`	Chooses a tool just as though it had been chosen from the Tools menu using the mouse.
`doMenu`	Performs a menu command just as though you had chosen it from the menu with the mouse.
`drag`	Does the same thing as dragging using the mouse.
`show cards`	Shows cards one after another on the screen. The cards to be shown (all or some number) must be in sequence.

Keywords

`end repeat`	The last statement of a `repeat` structure.
`exit repeat`	An alternative way out of a `repeat` structure.
`repeat`	Begins the `repeat` structure.

Functions

`the mouse`	Has as a value either `up` or `down`, corresponding to the state of the mouse button.
`the mouseLoc`	Gives the location of the pointer on the screen in horizontal and vertical coordinates.

Miscellaneous

`commandKey`	The HyperTalk name for the Command key.
`from`	A preposition; used with the `drag` command and some other commands.
`to`	A preposition; it's required with the `drag` command and in one version of a `repeat` structure, but it's optional with the `go` command (as seen in Chapter 1).

Syntax summaries

This section contains syntax descriptions of the commands you used in this chapter. Use this section for reference as needed.

Choose

The general structure of the `choose` command is as follows:

`choose` *toolName* `tool`

ToolName is any one of the HyperCard tools from the Tools menu. You must always use `tool` after the name. Here are the HyperTalk names for the tools that you can use:

`browse`	`field`	`reg[ular] poly[gon]`
`brush`	`lasso`	`round rect[angle]`
`bucket`	`line`	`select`
`button`	`oval`	`spray`
`curve`	`pencil`	`text`
`eraser`	`rect[angle]`	

The only tool you can't use from inside a handler is the Polygon tool.

You can use the `choose` command only when the user level is set to Painting, Authoring, or Scripting. You can set and reset the `userLevel` property inside a handler with the `set` command, if you don't want to change the user level permanently in a stack.

DoMenu

The `doMenu` command's structure is simple:

`doMenu "`*menuItem*`"`

MenuItem can be the name of a desk accessory in the Apple menu or the name of a menu command. It's best to include the quotation marks around a name to indicate it's a command name and not the name of a variable.

- *By the way:* Include three typed periods if that's how a particular command is shown in the menu; for instance, `"card info..."`. You must *type* the three periods; don't use the ellipsis character (Option-semicolon).

Drag

The `drag` command's syntax is

`drag from` *start* `to` *finish* `[with` *key*`[,` *key2*`[,` *key3*`]]]`

Start and *finish* are the points on the screen where the command starts to drag and where it ends up. The points are expressed as coordinates: two numbers representing horizontal and vertical placement in pixels, separated by commas. As mentioned earlier, the top left corner of the card window is `0,0`.

You can determine the coordinates of the pointer's position using the function `the mouseLoc`.

Key, key2, and *key3* are one or more of the following HyperTalk key names, which come after `with` and must be separated by commas: `shiftKey`, `optionKey`, or `commandKey`. Including more than one key has the same effect as holding down more than one key while dragging.

Show Cards

Here are the general forms of `show cards`:

```
show [all] cards
show number cards
```

Number is the number of cards you want to show if you don't want to show all of them. The cards are shown in sequence.

CHAPTER 6

Stacks You Can Build

THIS CHAPTER DESCRIBES TWO STACKS YOU COULD BUILD AND SCRIPT ON YOUR own, starting with materials already available in HyperCard.

This chapter is different from the preceding chapters in that you don't have to build these hypothetical stacks as you go, although you can if you like. Trying to build the stacks may help you assimilate what you've learned so far. The development of the stacks is discussed in a general way, however, rather than detailed step by step.

If the example stacks in this chapter don't appeal to you, you are free to experiment. Browse through the Idea Stacks folder for possibilities. For example, each card in the Stack Ideas stack comes with prewritten handlers in its background script. You can create new stacks from each of these "seed" cards by using the New Stack command and copying the background (the handlers are copied automatically). You could then add to and modify the scripts (and, for that matter, the appearance of the stack) to suit yourself.

❖ *By the way:* The *HyperCard Stack Design Guidelines,* available through Addison-Wesley Publishing Company, describes graphic, text, and instructional design principles as they apply to stacks.

A travel records stack

Suppose you wanted to computerize your records of vacation travels or business trips so that you could update them easily. You could create a stack in which to keep the information.

For the first card of this stack you could use a map of your country or a world map. A transparent button placed over each state or country would go to a card specific for that state or country when you clicked it. From each of the state- or country-specific cards, you could have other buttons to take you to cards for the cities or other localities you've visited. Finally, the city cards would have fields to contain information on accommodations and restaurants, clients visited (for a business stack), or points of interest (for a vacation travel stack).

Each time you visit a new state, you add a new transparent button to the country map and link it to a new card that you create for the state. Each time you visit a new city or other location, you add a new button for the city on that city's state card, create a new city card, and fill in the information in fields.

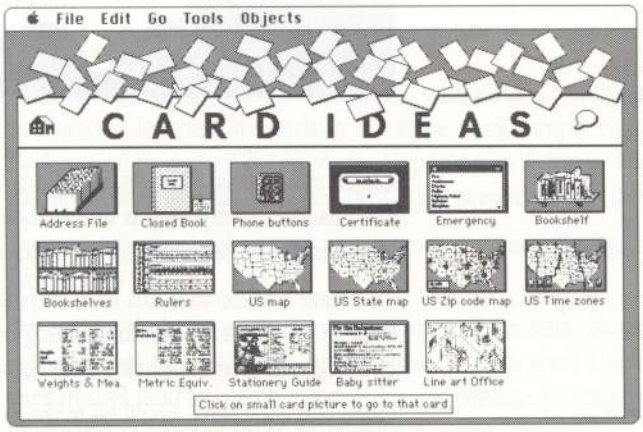
To build such a stack, you would use three backgrounds: one for the country or world map, one for the states or provinces, and one for the cities or locations. The different backgrounds would allow you to have different common fields for each of the three geographic levels. The next sections describe how to create this stack.

Creating the stack

If you want to try to create this stack, go right ahead; but be aware that not all steps are written out.

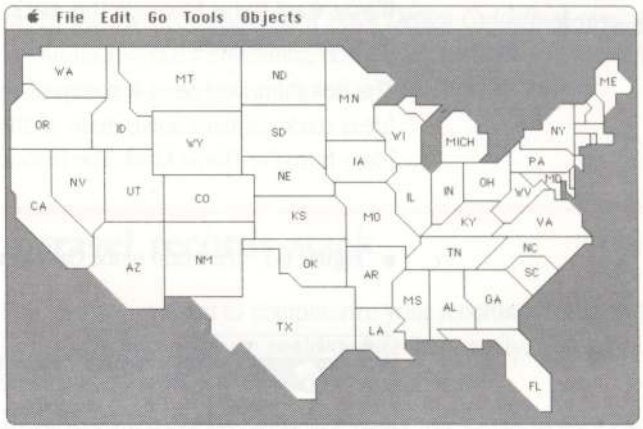
The first thing you need is a map of some sort as a starting point. The Card Ideas stack contains some maps of the United States; you can get to Card Ideas from the Home Card. The first card of Card Ideas is shown in Figure 6-1.

■ **Figure 6-1** First card of the Card Ideas stack



Click one of the small U.S. maps to go to a card with the same map on it; the one labeled "US State map," with state abbreviations, is a reasonable choice (Figure 6-2).

■ **Figure 6-2** A U.S. map showing state abbreviations



Check to see what elements of this card are background elements by pressing Command-B. Everything is in the background on this card, which means that if you copy the background you'll get everything you see.

To create a stack with this card as your first card, choose New Stack from the File menu. In the resulting dialog box, keep "Copy current background" checked and give the stack a new name—something like "My Travel Stack."

Once you click New, you'll be in the new stack, even though the card on the screen won't have changed. You can then name this first background by choosing Bkgnd Info from the Objects menu and typing a name—for instance, "Map Background."

❖ *Stack building tip:* It's a good idea to name backgrounds because you might want to create different backgrounds that look very similar. You can confirm which one is which in that case by checking their names.

You can also name this first card in the Card Info box; for example, "Main Map." You can then use the card's name in any handlers you write.

As with your practice stack, you can add a Home button to the background of this first card. You can copy a Home button, complete with script, from the Button Ideas stack or from any stack with a working Home button. Make sure you are working in the background before you paste the button.

You could also add a title to the first card (either as regular text in a field or as Paint text). It's also a good idea to add a line or two of instructions on the card, in case anyone besides yourself uses the stack; for example, "Click any state."

Because this stack uses buttons for each individual state or city to take you to the card you want, it's probably not necessary to add arrow buttons for traveling. Rather than moving card-by-card, you'll want to jump around. While setting up the stack, you can use the arrow keys or the Go menu to move to different cards, or you can create temporary travel buttons that you can delete later.

The second background

The next information level would be the state level. To create a new, blank background for the state cards in this same stack, simply choose New Background from the Objects menu. HyperCard will create a new card with the new, blank background. This card is the second card in the stack.

You can give this background a name such as "States Background" using the Bkgnd Info box.

On each of the state cards, you want a map of the state, its name, and perhaps some fields for relevant information. It's a good idea to create a background field to hold the states' names, because putting the name in a field lets you search for the name with the Find command.

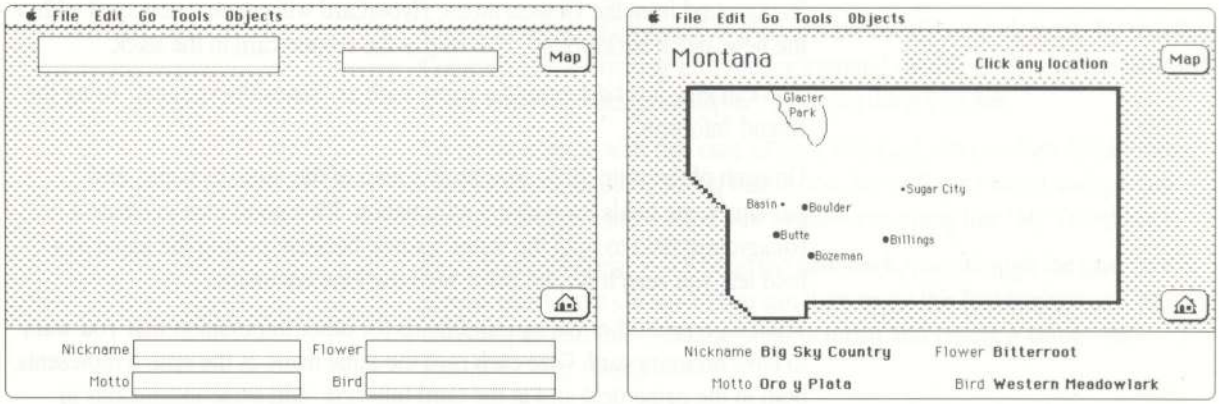
You can create other background fields for other information that you want to have on every card. Give each card the same name as the state it represents, both in the name field and in the Card Info box. Add some instructions in Paint text to the background, such as "Click any location." (Paint text in the background will appear on every card.)

Finally, you can add a background button to take you to the Home card and one to take you back to the main map card. This latter button's script needs a `mouseUp` handler with the statement `go to card "main map"` (or whatever name the card has). You could also add `visual effect iris close` or some other visual effect before the `go` statement.

Each state card can have as its card picture (not in the background) an image of the state. One quick way to make a rough state outline is to copy the small state image from the main map using the Lasso or Selection tool. (You must be in the background to copy a background picture.) You then go to the appropriate state card, paste the image, and stretch it to a larger size using Command-drag or Shift-Command-drag. You can refine the rough outline further if you want. Another way to add a state outline would be to find a clip-art stack with pictures or maps in it and copy them with the Import Paint command.

Figure 6-3 shows a background layout and a finished state card.

■ **Figure 6-3** One possible layout for state cards; the background, showing fields, on the left, entire card on the right



The third background

The next information level would be the cities, towns, or localities level, for which you can create another background by choosing New Background again; you'll get another blank card. You can name this third background "Local Background."

Again, make background fields for information such as the locality name, accommodations information, client addresses, restaurants, and so on—whatever information you want.

When filling in the information, if you find you have more information than will fit into a particular field, you could add a second card for the locality, including a card button or buttons to get to and from the second card. You could also use scrolling fields, which allow you to add as much text as you want, regardless of the size of the field on the screen.

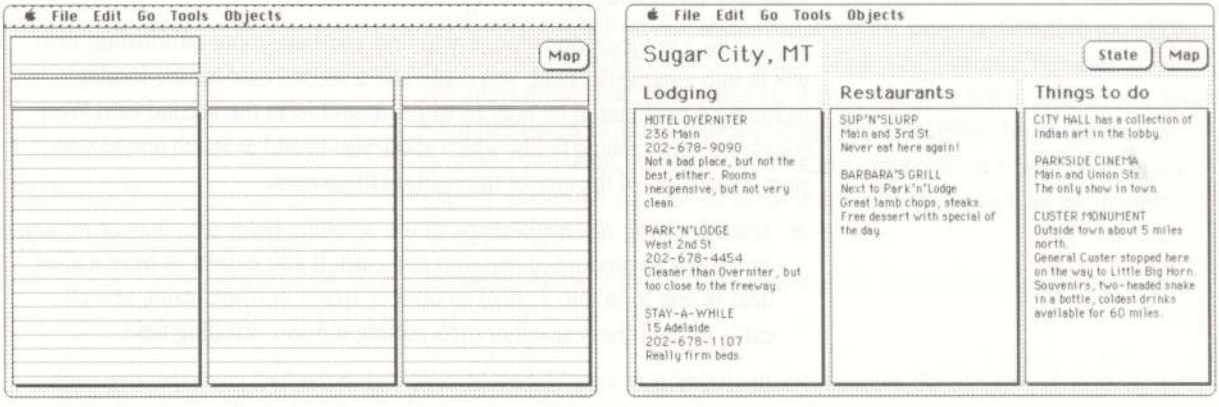
- *Stack building tip:* It's best not to use scrolling fields as a way of putting an enormous amount of text into one card. If you expect to have a great deal of text to fit into a small amount of space, consider using several cards to hold the text rather than putting it into a scrolling field.

Put the fields' permanent labels in Paint text in the background above each field—or you could create separate fields for the labels. Remember that you can use the Find command to search for text in fields, but you can't search for Paint text.

Add a background button to go back to the main map; you can copy it (and its handler, automatically) from the state card. Also include a *card* button to take you back to the state card. (You wouldn't want to put this button into the background, because the destination for the button's handler would have to be different for different localities.) You could add visual effects to these buttons' handlers also.

Figure 6-4 shows a background layout for the locality cards and a finished example for a fictional city.

■ **Figure 6-4** A possible layout for locality cards; the background, showing fields, on the left, entire card on the right.


File Edit Go Tools Objects
Map
File Edit Go Tools Objects
Sugar City, MT
State
Map
Lodging
Restaurants
Things to do
HOTEL OVERNITER
236 Main
202-678-9090
Not a bad place, but not the best, either. Rooms inexpensive, but not very clean.
PARK'N'LODGE
West 2nd St
202-678-4454
Cleaner than Overniter, but too close to the freeway.
STAY-A-WHILE
15 Adelaide
202-678-1107
Really firm beds.
SUP'N'SLURP
Main and 3rd St
Never eat here again!
BARBARA'S GRILL
Next to Park'n'Lodge
Great lamb chops, steaks. Free dessert with special of the day.
CITY HALL has a collection of Indian art in the lobby.
PARKSIDE CINEMA
Main and Union Sts.
The only show in town.
CUSTER MONUMENT
Outside town about 5 miles north.
General Custer stopped here on the way to Little Big Horn. Souvenirs, two-headed snake in a bottle, coldest drinks available for 60 miles.

How the stack would work

Here's a summary of how you would use this stack:

1. For each state you visit, create a transparent card button over the image of the state on the main map. For some states, the button may be difficult to size correctly because of the state's shape. Try to center the button over the state abbreviation.

   On the eastern seaboard, where many small states are close together, you might want to have a transparent button over the whole area on the main map and create a second map card with a blank background for just that area. You could copy and paste the eastern states, and then enlarge the area by selecting and stretching it on the second map card. Copy the Home button also, and make a button to take you back to the main map card.

△ **Important** Always think twice before you erase or change any graphics in the background. Any change you make in the background will happen on every card sharing the background.

You can cover background graphics on a card by using the Bucket or the Brush with a pattern or by using the Command key with the Eraser to "erase" with white (opaque) on the card layer. △

2. Create a new card using the second background for each state. Name the card the same as the state name. Then write a handler to link the transparent button on the main map to the respective card using the `go` command. The `zoom open` visual effect works well here.
3. Add cities or locations (such as national parks) to each state's map after you've visited them. Create a transparent button over each location.
4. For each location you visit, add a new card using the third background. Name the card the same as the location. Link the button on the state card to the location card.
5. Fill in the information for each place you visit in the appropriate fields.
6. When you plan to visit a locality again, or when you want information for some other purpose, use your stack to get the information quickly. You can print each locality card if you need to.

You could also include a `mouseUp` handler at the background or card level of the main map that would use the `answer` command to put up an alert box when someone clicks a state that doesn't yet have a button. Use a message such as "That state hasn't been visited yet." An OK button will appear automatically with the message—or you can add any button label you like.

A flash card stack

Flash cards are useful study aids for questions and answers, for vocabulary drill, or for any fact-memorization task. A word or a question is put on one side of a card, and the answer on the other side. You try to match each answer as you go through the cards.

A stack that acted like a set of flash cards could have the answers contained in a hidden field, which would be shown when you type the correct answer into another field and click a button, or when you give up and ask for the answer by clicking another button.

A flash card stack would most likely need only a single background. You might want to have the option of moving sequentially through all cards, picking a card at random, or sorting cards into a new random order (like shuffling). You would probably want to be able to tell where you are in the stack by seeing the number of the current card as well as the total number of cards.

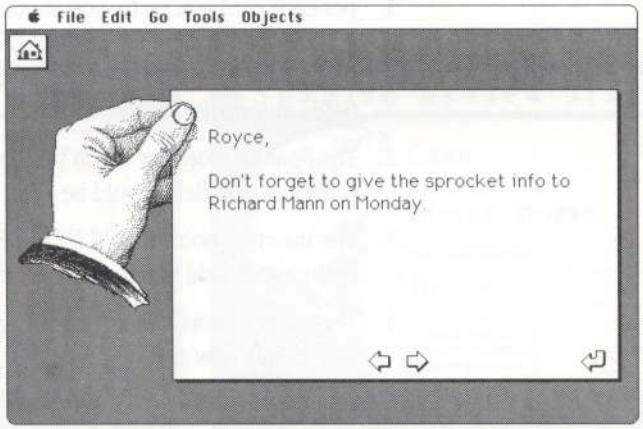
Creating the stack

You can start by going to the Stack Ideas stack to look for some possible starting points for building your stack. You can get to Stack Ideas from the Home card. Figure 6-5 shows the first card of Stack Ideas.

■ **Figure 6-5** First card of the Stack Ideas stack

Clicking any of the images takes you to a full-size card. These cards contain prewritten handlers for navigation buttons as well as other ready-made scripts, often in their backgrounds. The card that looks like a hand holding a note card might be a good choice for the flash card stack (Figure 6-6).

■ **Figure 6-6** A card with a note card image on it



You can check the background by pressing Command-B; you might also want to look at the fields on the card; you'll see there's one large transparent field in the background. You can change the size of this field and duplicate it to make more fields if you want.

To create a new stack from this card, choose New Stack from the File menu., copy the current background, and name the stack.

Features of the stack

The idea of this flash card stack is that the words or information on the cards changes, but the shape and appearance of the cards don't. You can put essentially all the fields, buttons, and labels into the background. The test words and answers are typed into background fields; every card can have different text.

Here is a description of the features needed to make a flash card stack for Spanish-to-English vocabulary:

1. For each card you go to, you should be able to see the number of the card and the total number of cards in the stack. You could make a field for each number and write a handler to put the correct numbers into the fields automatically.
2. The Spanish word for which you are being tested needs to be in a field. A background field would be best.
3. The insertion point should be placed automatically into another, blank background field where you would type your answer.
4. The correct answer, in a third background field, should be hidden when you go to a new card.
5. A button should be available to check whether the English word you type is correct.
6. A button should be available for "giving up" and showing the hidden field.
7. Something should happen if the guess is wrong—a message and a chance to try again.
8. It would be nice to be able to choose random cards and to sort the cards in random order.

Figure 6-7 shows a completed version of this stack, a vocabulary stack for Spanish. The card on the left shows the background, including fields. The card on the right shows the entire image, complete with a word, an answer, and the correct answer showing.

■ **Figure 6-7** One possible layout for a flash card stack; the background, showing fields, on the left, entire card on the right

Notice that the preexisting arrow buttons and Home button have been moved and changed to rectangle buttons. You can move any button anywhere you want it and change its style as you like; the button will still act the same way.

The single field on the original card in Stack Ideas has been duplicated to create a total of six fields, all in the background: one field, at the top, holds the title of the stack; another contains the word in Spanish; a third field holds the correct answer, which is hidden until you get the right answer or give up; the next field is where you type your answer or guess; and the last fields are the small fields in the upper-right corner of the card that tell you the card number and the total number of cards.

The scripts

This section shows the handlers that accomplish the flash card stack's actions. Notice that the handlers have been placed where they work most effectively.

Some objects have **empty** scripts—that is, their scripts contain no handlers—and so they are not listed here. The card scripts are empty and so are the scripts for all fields.

The stack script

The following handlers are placed at the stack level so that they are available to every card in the stack automatically.

This first handler came with the stack; when the stack opens, the handler puts away the Message box in case it's been left open:

```
on openStack
  hide message box
end openStack
```

This next handler does three things; it uses the `put` command to put the number of each card and total number of cards, respectively, into the fields in the upper-right corner of the card, and it uses the `click` command to set the insertion point into the field where you type your answer, so you're ready to type immediately when the card opens. (The fields were given names in their Info boxes when they were made.)

```
on openCard
  put the number of this card into field "cardNumber"
  put the number of last card into field "totalNumber"
  click at the loc of field "guess"
end openCard
```

The final handler hides the field with the correct answer and blanks out the Guess field and the Card Number field:

```
on closeCard
  hide field "answer"
  put empty into field "guess"
  put empty into field "cardNumber"
end closeCard
```

It's better to hide the Answer field and to blank out the Guess field when leaving a card (`closeCard`). If you hid the Answer field upon opening the card (`openCard`), you would see a "ghost" of the answer when the new card appeared, spoiling the test. Blanking out the Card Number field when leaving the card is also cleaner; otherwise, if the card number had changed, you would see a "ghost" of the old number.

The background script

The background script contains this handler, which came with the stack:

```
on openBackground
  push recent card
end openBackground
```

The `openBackground` handler contains the statement `push recent card`. The "recent card" is whatever card you were on just before you came to this stack, if any. This statement keeps track of that card by "pushing" it onto a memory stack (different from a HyperCard stack). The return-arrow button in the lower-right corner of the card contains the reverse command, `pop card`. When you click the return-arrow button, the card that had been pushed is now "popped" out of the memory stack, and you go back to it. You use the `push` and `pop card` commands to have HyperCard keep track of where you've been so you can get back automatically.

The return-arrow button

This handler could just as easily have been at the stack level. In a stack with multiple backgrounds, it probably ought to be at the stack level.

The button scripts

The scripts for the Home button and the right-arrow and left-arrow buttons are what you would expect them to be from writing the handlers in the earlier chapters.

The return-arrow button script contains this handler, as mentioned in the preceding section:

```
on mouseUp
  pop card
end mouseUp
```

The "Check answer" button script contains this handler:

```
on mouseUp
  if field "guess" is in field "answer" then
    show field "answer"
  else
    beep
    answer "Oops. Select the word and try again."
  end if
end mouseUp
```

The `if` statement uses the phrase `is in` to compare the string of characters typed into the Guess field with any string of characters in the Answer field, allowing you to include several meanings for any word. In the sample shown previously in Figure 6-7, either *house* or *home* would be a correct answer. Capitalization doesn't matter.

The "Show answer" button has this handler:

```
on mouseUp
  show field "answer"
end mouseUp
```

The "Random Card" button has this handler:

```
on mouseUp
  visual effect scroll down
  go to any card
end mouseUp
```

The "Shuffle" button script contains this handler:

```
on mouseUp
  sort numeric by random(the number of cards)
end mouseUp
```

The `sort` command puts all the cards in a stack in order, or in this case in no particular order. This command can sort in ascending or descending order, alphabetically (text) or numerically, and you can sort by such things as card name, card number, a field name, a word in a field, and so on. Here are some examples:

```
sort ascending text by last word of field "Name"

sort descending numeric by field 2
```

In the example stack, the `random()` function causes a sort into random order. The parentheses must contain a number—in this case, it's the number of cards in the stack. You could use the `random()` function to pick a number from 1 to 10 by putting 10 inside the parentheses—for instance, as part of a game.

How the stack would work

Once the stack is set up, its use is simple.

1. Add a new card for every new word.
2. Type the word into field 1 (which is named Word).
3. Use the `show` command in the Message box to show the hidden Answer field and then type the correct answer or answers into the field.
4. For review purposes, use the buttons to go through the stack and to shuffle its order. Type your answer for each word into the Guess field and click "Check answer." If you can't make a guess, click "Show answer."

❖ *By the way:* You can sort the cards into alphabetical order from the Message box with the statement

```
sort ascending text by field "word"
```

You could copy and modify the stack for other languages or subjects. You could even reverse the action of the stack—that is, make it English-to-Spanish rather than Spanish-to-English—simply by changing the handlers. (Can you think of how you might do this?)

Where to go from here

Now that you're an experienced scripter, you can go on to other sources to learn more about HyperTalk and the possibilities of using HyperCard. Many people have written books on HyperCard and scripting that you might find helpful. The *HyperCard Script Language Guide* contains complete descriptions of HyperTalk elements. The HyperCard Help system is also a good reference to consult while you're working.

Some of your most valuable scripting information is likely to come from your own experimentation and experience. Think of ways you can change existing stacks to suit yourself—and then look at those stacks' scripts to see how they work and how you might modify them. Use your practice stack as a place to test handlers and as a repository for buttons with prewritten handlers and other scripts that you can copy and paste when you want them. Talk to other HyperCard users and scripters, and exchange tips and shortcuts. Most of all, enjoy using a new tool that enhances your creativity.

A P P E N D I X

HyperTalk Summary

THIS APPENDIX CONTAINS SYNTAX STATEMENTS FOR ALL HYPERTALK BUILT-IN COMMANDS and functions; lists of keywords, properties, constants, and system messages; a table of operators and their order of precedence; keyboard shortcuts for seeing scripts; and synonyms and abbreviations.

The Quick Reference Card contains the script editor commands, keyboard shortcuts, commands and functions, and list of operators.

Syntax statement notation

Syntax statements show the most general form of a command or function, with all elements in the correct order. The syntax statements in this book use the following typographic conventions: Words or phrases in `this kind of type` are Hypertalk language elements that you type literally, exactly as shown. Square brackets `[]` enclose optional elements that may be included if you need them. (Don't type the square brackets.) In some cases, optional elements change what the command does; in other cases they have no effect except to make the command more readable. Words in *italic* are placeholders describing general elements, not specific names; you must replace them in an actual command. For example, *effectName* stands for any of the HyperTalk visual effect names: `barn door`, `checkerboard`, `zoom`, and so on.

It doesn't matter whether you use uppercase or lowercase letters in HyperTalk, but names that are formed from two words are shown in small letters with a capital in the middle (`likeThis`) merely to make them more readable.

The HyperTalk prepositions `of` and `in` are interchangeable—the syntax statements use the one that sounds more natural.

Commands

The following list includes all HyperTalk commands available in version 1.2.2. A full description of the action of these commands is beyond the scope of this appendix. The HyperCard Help system contains a HyperTalk reference section explaining the use of the commands through version 1.1. The *HyperCard Script Language Guide* also contains complete descriptions of HyperTalk commands, functions, and so on. Many other books on HyperCard and scripting are also available.

`add` *expression* `to` *destination*

`answer "`*question*`" [with "`*reply*`" [or "`*reply2*`" [or "`*reply3*`"]]]`

`arrowKey` *keyName*

`ask [password]` *question* `[with` *defaultAnswer*`]`

`beep` *number*

`choose` *toolName* `tool`

`click at` *location* `[with` *key*`[,` *key2*`[,` *key3*`]]]`

`close file` *fileName*

```
close printing
controlKey asciiNumber
convert container to format [and format]
delete chunk [of container]
dial expression [with modem [modemCommands]]
divide destination by expression
doMenu menuItem
drag from start to finish [with key[,key2[,key3]]]
edit script of object
enterKey
find [chars] expression [in field fieldDesignator]
find [word] expression [in field fieldDesignator]
find string expression [in field fieldDesignator]
find whole expression [in field fieldDesignator]
functionKey keyNumber
get expression
go [to] [stack] "stackName"
go [to] bkgndDescriptor [of [stack] "stackName"]
go [to] cardDescriptor [of bkgndDescriptor] [of [stack] "stackName"]
help
hide menuBar
hide windowName
hide object
hide picture
lock screen
multiply destination by expression
open [document with] application
open file fileName
open printing [with dialog]
play "voice" [tempo tempoValue] ["notes"]
play stop
pop card [preposition destination]
print card
print expression cards
print cardDescriptor
```

```
print document with application
push cardDescriptor
put expression [preposition destination]
read from file fileName until character
read from file fileName for numberOfCharacters
reset paint
returnKey
select object
select [preposition] expression of field
select [preposition] expression of msg
select [preposition] text of field
select empty
set [the] property [of object] to value
show [all] cards
show number cards
show menuBar
show windowName [at h, v]
show object [at h, v]
show picture
sort [direction] [style] by expression
subtract expression from destination
tabKey
type expression [with key[, key2[, key3]]]
unlock screen [with effectName]
visual [effect] effectName [speed] [to image]
wait [for] number [seconds]
wait until condition
wait while condition
write source to file fileName
```

Functions

The following list includes all HyperTalk functions available in version 1.2.2.

When using functions in HyperTalk statements you must either use the word `the` before the function name or add parentheses after it (both forms are shown in the list that follows). The parentheses are used to enclose any values on which the function operates. These values are called **parameters.** If the function takes several parameters (for example, the `average` function), the parameters must be separated by commas. See the *HyperCard Script Language Guide* for a more complete discussion of functions and parameters.

Factor is a single value, such as the number 5 or a container holding a value; *expression* can be a single factor or a combination of several factors and operators that results in a value, such as `(2+3)` or `(2+(field 1))`.

The result or use of a function is shown on the right side of the page.

`the abs of` *factor* `abs (`*expression*`)`	Absolute value
`annuity (`*rate*`,` *periods*`)`	Calculates an annuity
`the atan of` *factor* `atan (`*expression*`)`	Arc tangent—radians
`average (`*list*`)`	Calculates an average
`the charToNum of` *factor* `charToNum (`*expression*`)`	Returns the ASCII value of a character
`the clickH`	Gives horizontal coordinate of where the user last clicked
`the clickLoc` `clickLoc()`	Gives horizontal and vertical coordinates of where the user last clicked
`the clickV`	Gives vertical coordinate of where the user last clicked
`the commandKey` `commandKey()`	Condition of the Command key: `up` or `down`
`compound (`*rate*`,` *periods*`)`	Calculates compound interest
`the cos of` *factor* `cos (`*expression*`)`	Cosine—radians
`the [`*modifier*`] date`	Current date set in the Macintosh: long or short
`the diskSpace` `diskSpace()`	Amount of free space on the current disk

`the exp of` *factor* `exp(`*expression*`)`	Mathematical exponential
`the expl of` *factor* `expl(`*expression*`)`	1 less than mathematical exponential: `exp()-1`
`the exp2 of` *factor* `exp2(`*expression*`)`	The value of 2 raised to the power of *factor*
`the foundText`	Returns characters found by the `find` command
`the foundChunk`	Returns a description of where the text is found
`the foundLine`	Tells which line the found text is in
`the foundField`	Tells which field the found text is in
`the length of` *factor* `length(`*expression*`)`	Number of characters in a text string
`the ln of` *factor* `ln(`*expression*`)`	Natural logarithm—base-*e*
`the ln1 of` *factor* `ln1(`*expression*`)`	1 plus the natural logarithm: `ln(1+`*factor*`)`
`the log2 of` *factor* `log2(`*expression*`)`	Base-2 logarithm
`max(`*list*`)`	Returns the highest number value of a list
`min(`*list*`)`	Returns the lowest number value of a list
`the mouse` `mouse()`	Condition of the mouse button: `up` or `down`
`the mouseClick` `mouseClick()`	Returns `true` if the mouse button is clicked
`the mouseH` `mouseH()`	Horizontal position of the pointer on the screen
`the mouseLoc` `mouseLoc()`	Horizontal and vertical coordinates of the pointer
`the mouseV` `mouseV()`	Vertical position of the pointer
`[the] number of` *objects*	Number of buttons/fields on current card or background

`[the] number of` *chunks* `in` *factor*	Number of characters, words, lines, and so on in text string
`[the] number of cards of` *background*	Number of cards in specified background
`the numToChar of` *factor* `numToChar (`*expression*`)`	Returns the character corresponding to an ASCII value
`offset (`*string1*`,` *string2*`)`	Gives number of characters between the beginnings of two strings
`the optionKey` `optionKey ()`	Condition of the Option key: `up` or `down`
`the param of` *factor* `param (`*expression*`)`	Returns the value of a parameter in a list
`the paramCount` `paramCount ()`	The total number of parameters
`the params` `params ()`	The entire list of parameters
`the random of` *factor* `random (`*expression*`)`	Gives a random integer from 1 to the value of *factor*
`the result` `result ()`	Returns a text string if `find` or `go` is unsuccessful
`the round of` *factor* `round (`*expression*`)`	Rounds to nearest integer: an odd integer plus 0.5 rounds up; an even integer, down
`the screenRect` `screenRect ()`	The rectangle of the screen in which the menu bar is displayed: left, top, right, bottom coordinates
`the seconds` `seconds ()`	Number of seconds between midnight January 1, 1904, and the current time in your Macintosh
`the selectedText`	Returns the text currently selected
`the selectedChunk`	Describes the location of the selected text
`the selectedLine`	Tells which line the selected text is in
`the selectedField`	Tells which field the selected text is in
`the shiftKey` `shiftKey ()`	Condition of the Shift key: `up` or `down`
`the sin of` *factor* `sin (`*expression*`)`	Sine—radians

`the sin of` *factor* `sin(`*expression*`)`	Sine—radians
`the sound` `sound()`	Name of sound resource currently playing, or `"done"` if none is playing
`the sqrt of` *factor* `sqrt(`*expression*`)`	Square root of a positive number—a negative number gives the result `NAN(001)` meaning "not a number"
`the tan of` *factor* `tan(`*expression*`)`	Tangent—radians
`the target` `target()`	Identifies the original recipient of a message
`the ticks` `ticks()`	Number of ticks (1/60 second) since the Macintosh was turned on or restarted
`the [`*modifier*`] time` `time()`	Gives time as a text string: long, short, abbreviated
`the tool` `tool()`	Name of currently chosen tool
`the trunc of` *factor* `trunc(`*expression*`)`	The integer part of a number in *function*
`the value of` *factor* `value(`*expression*`)`	Gives the value of a string as an expression
`the [long] version [of HyperCard]` `version()`	Returns the version number of HyperCard
`the version of` *stackDescriptor*	Tells version of HyperCard used to create, compact, change since compacted, and make latest changes, plus the date modified in seconds since January 1, 1904

Keywords

The following list of HyperTalk keywords includes their syntax, where appropriate, or a comment on their use. Keywords are predefined; you can't redefine them—for instance, you can't use a keyword as a name of a variable.

`Send` is the only keyword that can be used in the Message box.

`do`	`do` *expression*
`else`	`-- used with "if" structures`

`end`	`end` *functionName*
	`end` *messageName*
	`end if`
	`end repeat`

`exit`	`exit` *functionName*
	`exit` *messageName*
	`exit repeat`
	`exit to HyperCard`

`function`	`function` *functionName* [*parameterList*]
`global`	`global` *variableList*
`if`	`-- begins "if" structures`
`next`	`next repeat`
`on`	`on` *messageName*
`pass`	`pass` *functionName* `pass` *messageName*
`repeat`	`-- begins "repeat" structures`
`return`	`return` *expression*
`send`	`send "`*messageName* [*parameterList*]`"` [`to` *object*]
`then`	`-- used in "if" structures`

Properties

This section lists properties of the HyperCard environment and of objects available in HyperCard version 1.2.2.

Global properties

```
blindTyping
cursor
dragSpeed
edit Bkgnd
language
lockMessages
lockRecent
lockScreen
numberFormat
powerKeys
textArrows
userLevel
userModify
```

Window properties

```
the bottom of
the bottomRight of
the height of
the left of
loc[ation]
rect[angle]
the right of
the top of
the topLeft of
the width of
```

Painting properties

```
brush
centered
filled
grid
lineSize
multiple
multiSpace
pattern
polySides
textAlign
textFont
textHeight
textSize
textStyle
```

Stack properties

```
cantDelete
cantModify
freesize
name
script
size
```

Background properties

cantDelete	name	script
ID	number	showPict

Card properties

cantDelete	name	script
ID	number	showPict

Field properties

autoTab	number	textHeight
the bottom of	rect[angle]	textSize
the bottomRight of	the right of	textStyle
the height of	script	the top of
ID	scroll	the topLeft of
the left of	showLines	visible
loc[ation]	style	wideMargins
lockText	textAlign	the width of
name	textFont	

Button properties

autoHilite	name	textHeight
the bottom of	number	textSize
the bottomRight of	rect[angle]	textStyle
the height of	the right of	the top of
hilite	script	the topLeft of
icon	showName	visible
ID	style	the width of
the left of	textAlign	
loc[ation]	textFont	

Constants

Constants are named values that never change. You can't use the name of a constant as a variable name.

`down`	The value of the key functions for Command, Option, and Shift keys and for the mouse button when pressed
`empty`	The string containing nothing (the **null** string)—same as `""`
`false`	The opposite of `true`
`formFeed`	The form feed character, ASCII 12
`lineFeed`	The line feed character, ASCII 10
`pi`	The value of pi to 20 decimal places
`quote`	The double quotation mark character
`return`	The return character, ASCII 13
`space`	The space character, ASCII 32—same as `" "`
`tab`	The horizontal tab character, ASCII 9
`true`	The opposite of `false`
`up`	The value of the key functions for Command, Option, and Shift keys and for the mouse button when not currently pressed
`zero..ten`	The numbers 0 through 10

System messages

These messages are sent to the objects specified to inform them of system events. Some messages are accompanied by a variable (*var*), the nature of which depends on the message. For example, the `arrowKey` variable can be `left`, `right`, `up`, or `down`.

Messages sent to a button

`deleteButton`
`mouseDown`
`mouseEnter`
`mouseLeave`
`mouseStillDown`
`mouseUp`
`mouseWithin`
`newButton`

Messages sent to a field

`closeField`
`deleteField`
`enterInField`
`mouseDown`
`mouseEnter`
`mouseLeave`
`mouseStillDown`
`mouseUp`
`mouseWithin`
`newField`
`openField`
`returnInField`
`tabKey`

Messages sent to the current card

`arrowKey` *var*
`closeBackground`
`closeCard`
`closeStack`
`controlKey` *var*
`deleteBackground`
`deleteCard`
`deleteStack`
`doMenu` *var*
`enterKey`
`functionKey` *var*
`help`
`hide` *var*
`idle`
`mouseDown`
`mouseStillDown`
`mouseUp`
`newBackground`
`newCard`
`newStack`
`openBackground`
`openCard`
`openStack`
`quit`
`resume`
`returnKey`
`show` *var*
`startUp`
`suspend`
`tabKey`

Operator precedence

The table below shows the order of precedence of HyperTalk operators. The order of precedence determines which operation HyperCard performs first when evaluating an expression. Operators are evaluated from left to right, except for exponentiation, which is from right to left. Parentheses force evaluation in a certain order; for example, `2*3+5` yields `11`, but `2*(3+5)` yields `16`.

Order	Operators	Type of operator
1	`( )`	Grouping
2	`-`	Minus sign for numbers
	`not`	Logical negation for Boolean values
3	`^`	Exponentiation for numbers
4	`* / div mod`	Multiplication and division for numbers
5	`+ -`	Addition and subtraction for numbers
6	`& &&`	Concatenation of text
7	`> < <= >= ≤ ≥`	Comparison for numbers or text
	`is in contains`	Comparison for text
	`is not in`	Comparison for text
8	`= is is not <> ≠`	Comparison for numbers or text
9	`and`	Logical for Boolean values
10	`or`	Logical for Boolean values

Shortcuts for seeing scripts

These shortcuts were introduced with HyperCard version 1.2.

Key combination	Effect
Command-Option	Display buttons; click a button with keys down to edit its script
Shift-Command-Option	Display fields and buttons; click a field (or button) with keys down to edit its script
Command-Option-C	Edit script of current card
Command-Option-B	Edit script of current background
Command-Option-S	Edit script of current stack

Synonyms and abbreviations

These synonyms and abbreviations include those introduced with HyperCard version 1.2.

Term	Synonym or abbreviation
`abbreviated`	`abbr` `abbrev`
`background`	`bg` `bkgnd`
`backgrounds`	`bgs` `bkgnds`
`button`	`btn`
`buttons`	`btns`
`card`	`cd`
`cards`	`cds`

Term	Synonym or abbreviation
character	char
characters	chars
commandKey	cmdKey
field	fld
fields	flds
gray	grey
location	loc
message box	message msg box msg
middle	mid
picture	pict
previous	prev
rectangle	rect
regular polygon	reg poly
round rectangle	round rect
second (time unit)	sec or secs or seconds
second (ordinal)	sec or secs or seconds
spray can	spray
ticks	tick

Glossary

algorithm: A step-by-step procedure for solving a problem or accomplishing a task. Writing HyperTalk handlers or programs in other languages often begins with figuring out a suitable algorithm for a task.

ASCII: Acronym for *American Standard Code for Information Interchange,* pronounced "ASK-ee." A standard that assigns a unique number to each text character and control character. ASCII code is used for representing text inside a computer and for transmitting information between computers and other devices.

background: A "holding area" where you can place elements that you want a group of cards to have in common. A background is an object and thus has a script; you can place handlers in its script that you want to be accessible to all cards in a group. See also **object.**

background picture: The part of the screen image that is common to all cards sharing a background; that is, the part that's not specific to a card.

card picture: The part of the screen image that is specific to the card; that is, the part that's not on the background level.

command: A HyperTalk "action item." Commands are instructions in HyperTalk for HyperCard to carry out. HyperCard has approximately 50 built-in commands. Compare with **function, keyword.**

comments: Descriptive lines of text in a script or program that are not intended as instructions for the computer but rather as explanations for people to read. Comments are set off from instructions by symbols called **delimiters,** which vary from language to language. In HyperTalk, two hyphens (`--`) indicate the beginning of a comment.

constant: An entity having a fixed, unchanging value. HyperTalk contains a number of constants, such as `true`, `false`, `up`, `down`, and `pi`. Compare **variable.**

container: A place where you can store a value; examples are HyperCard fields, the Message box, and **variables.** See also **values.**

delimiter: A character used to mark the beginning or end of something, that is, to define limits. For example, double quotation marks act as delimiters for **literals.** Comments in HyperTalk are set off with two hyphens at the beginning of the comment and a return character at the end.

empty: (adj.) Used to describe scripts that contain no handlers. Every HyperCard object has a script, even if the script is empty. See also **null.**

ex-command or **external command:** See **XCMD.**

function: A formula that HyperCard uses to obtain a value. You must sometimes supply a function with starting values or **parameters.** HyperCard has approximately 50 built-in functions. Compare with **command, keyword.**

global variable: A variable that is valid for all handlers in which it is declared. You declare a global variable by preceding its name by the keyword `global`. Compare with **local variable.** See also **variable.**

handler: A set of HyperTalk instructions specific to a **message.** A handler must begin with the keyword `on` and end with the keyword `end`. Both keywords must be followed by the name of the message.

keyword: A HyperTalk word having a predefined meaning that you cannot change. Some examples of keywords are `end`, `if`, `on`, `repeat`, and `send`.

literal: (n.) Something you want taken literally. In HyperTalk you use quotation marks (`" "`) to set off a string of characters as a literal, such as the name of an object or a group of words you want treated as a text string.

local variable: A variable that is valid only within the handler in which it is used. Compare with **global variable.** See also **variable.**

loop: A section of a handler that is repeated until a limit or condition is met, such as in a `repeat` structure. See **loop.**

message: A string of characters sent to an object. You can write handlers in the object's script containing instructions for HyperCard to carry out when the message is received. Messages that come from the system—from events such as mouse clicks, keyboard actions, or menu commands—are called *system messages*. Messages can also be sent from the Message box or from handlers. See also **handler, object hierarchy.**

message-passing hierarchy: See **object hierarchy.**

metasymbol: See **syntax.**

null: (adj.) Having no value at all, not even zero. The HyperTalk constant `empty` is defined as a string containing nothing, that is, a *null string*. A string containing `zero` would not be `empty`.

object: Any HyperCard element that has a script associated with it and that can receive and send messages. Objects are stacks, backgrounds, cards, fields, and buttons.

object hierarchy: The order in which a message is passed between objects. For example, a message that goes first to a button, such as `mouseUp`, would go next to the card, then the background, then the stack, and finally to HyperCard itself, unless intercepted and acted upon by a handler.

operator: A character or group of characters that causes a particular calculation or comparison to occur. Operators operate on **values.** For example, the plus sign (+) is an arithmetic operator that adds numerical values.

parameters: Values that accompany or are acted upon by a function. Parameters in HyperTalk are separated by commas.

pixel: Short for *picture element;* the smallest dot you can draw on the screen. The position of the pointer is often represented by a set of two numbers separated by commas. These numbers are horizontal and vertical distances of the pointer from the top and left edges of the card window, measured in pixels. The top-left corner of the screen has the coordinates `0,0`.

properties: Characteristics of objects or of HyperCard as a whole. For example, setting the user level to Scripting changes the `userLevel` property of HyperCard to the value 5. Properties are often selected as options in dialog boxes or on palettes, or they can be set from handlers.

script: A collection of HyperTalk instructions associated with a HyperCard object. You use the object's script editor to add to and revise its script. Every object has a script, even though some scripts are *empty;* that is, they contain nothing. See also **handler, object.**

script editor: A large dialog box containing a window in which you can type and edit a script. The top line of the script editor box identifies the object to which the script belongs. You use keystroke commands to edit text in the script editor. See also **handler, object, script.**

scripting: The act of writing scripts; writing programs in HyperTalk. Also **Scripting,** the User Level that allows you to look at and change objects' scripts.

string: A sequence of characters. You can compare and combine strings in different ways using **operators.** For example, in HyperTalk `23 + 23` will result in 46; but `23 & 23` will result in 2323.

syntax: A description of the way in which language elements fit together to form meaningful phrases. A syntax statement for a command shows the command in its most generalized form, including placeholders (sometimes called *metasymbols*) for elements you must fill in as well as optional elements.

system message: See **message.**

tick: One-sixtieth (1/60) of a second. The `wait` command assumes a value in ticks unless you specify seconds by adding `secs` or `seconds`.

values: Information on which HyperCard operates. Values in HyperCard are essentially strings of characters—they are not formally separated into types. For example, a numeral could be interpreted as a number or as text, depending on what you do with it in a handler.

variable: An entity that has a changing value. HyperCard has built-in variables such as `it` and `the selection`. You can create a variable to hold some value (either numbers or text) simply by using its name with the `put` command and putting the value into it. Compare with **constant.** See also **container, global variable, local variable.**

XCMD: Short for *external command;* a command written in a computer language other than HyperTalk but made available to HyperCard to extend its built-in command set. Similarly, an *XFCN,* or *external function,* is a function written in another language.

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HyperTalk™
Quick Reference Card

The information in this Quick Reference Card pertains to HyperCard version 1.2.2.

Script editor command summary

Key combination	Action
Command-A	Select entire script
Command-C	Copy selection to Clipboard
Command-F	Find text (same as Find button)
Command-G	Find next occurrence of same text
Command-H	Find current selection
Command-P	Print selection or (if no selection) entire script (same as Print button)
Command-period	Close script without saving changes (same as Cancel button)
Command-V	Paste Clipboard contents at insertion point
Command-X	Cut selection to Clipboard
Enter	Close script and save changes (same as OK button)
Option-Return	Wrap line without return character ("soft" return—symbolized by ¬ in scripts. Don't use a "soft" return inside quotation marks.)
Return	Return character—indicates end of HyperTalk statement
Tab	Format script

Shortcuts for seeing scripts

Key combination	Effect
Command-Option	Display buttons; click a button with keys down to edit its script
Shift-Command-Option	Display fields and buttons; click a field (or button) with keys down to edit its script
Command-Option-C	Edit script of current card
Command-Option-B	Edit script of current background
Command-Option-S	Edit script of current stack

Commands

In the statements listed below, square brackets [ ] enclose optional elements. (Don't type the square brackets.) Words in *italic* are placeholders describing general elements, not specific names; you must replace them in an actual command. It doesn't matter whether you use uppercase or lowercase letters in HyperTalk; names formed from two words are shown with an embedded capital letter (`likeThis`) merely to make them more readable. The HyperTalk prepositions `of` and `in` are interchangeable.

`add` *expression* `to` *destination*

`answer "`*question*`" [with "`*reply*`" [or "`*reply2*`" [or "`*reply3*`"]]]`

`arrowKey` *keyName*

`ask [password]` *question* `[with` *defaultAnswer*`]`

`beep` *number*

`choose` *toolName* `tool`

`click at` *location* `[with` *key*`[,` *key2*`[,` *key3*`]]]`

`close file` *fileName*

`close printing`

`convert` *container* `to` *format* `[and` *format*`]`

`controlKey` *asciiNumber*

`delete` *chunk* `[of` *container*`]`

`dial` *expression* `[with modem [`*modemCommands*`]]`

`divide` *destination* `by` *expression*

`doMenu` *menuItem*

`drag from` *start* `to` *finish* `[with` *key*`[,` *key2*`[,` *key3*`]]]`

`edit script of` *object*

`enterKey`

`find [chars]` *expression* `[in field` *fieldDesignator*`]`

`find [word]` *expression* `[in field` *fieldDesignator*`]`

`find string` *expression* `[in field` *fieldDesignator*`]`

`find whole` *expression* `[in field` *fieldDesignator*`]`

`functionKey` *keyNumber*

`get` *expression*

`go [to] [stack] "`*stackName*`"`

`go [to]` *bkgndDescriptor* `[of [stack] "`*stackName*`"]`

`go [to]` *cardDescriptor* `[of` *bkgndDescriptor*`] [of [stack] "`*stackName*`"]`

`help`

`hide menuBar`

`hide` *windowName*

`hide` *object*

`hide` *picture*

```
lock screen
multiply destination by expression
open [document with] application
open file fileName
open printing [with dialog]
play "voice" [tempo tempoValue] ["notes"]
play stop
pop card [preposition destination]
print card
print expression cards
print cardDescriptor
print document with application
push cardDescriptor
put expression [preposition destination]
read from file fileName until character
read from file fileName for numberOfCharacters
reset paint
returnKey
select object
select [preposition] expression of field
select [preposition] expression of msg
select [preposition] text of field
select empty
set [the] property [of object] to value
show [all] cards
show number cards
show menuBar
show windowName [at h, v]
show object [at h, v]
show picture
sort [direction] [style] by expression
subtract expression from destination
tabKey
type expression [with key[, key2[, key3]]]
unlock screen [with effectName]
visual [effect] effectName [speed] [to image]
wait [for] number [seconds]
wait until condition
wait while condition
write source to file fileName
```

Functions

In the statements listed below, square brackets `[ ]` enclose optional elements. (Don't type the square brackets.) Words in italic are placeholders describing general elements, not specific names; you must replace them in an actual command. It doesn't matter whether you use uppercase or lowercase letters in HyperTalk; names formed from two words are shown with an embedded capital letter (`likeThis`) merely to make them more readable. The HyperTalk prepositions `of` and `in` are interchangeable.

When using functions in HyperTalk statements you must either use the word `the` before the function name or add parentheses after it. Both forms are shown in the list that follows. *Factor* is a single value, such as the number 5 or a container holding a value; *expression* can be a single factor or a combination of several factors and operators that results in a value, such as `(2+3)` or `(2+(field 1))`. Parameters in a list must be separated by commas.

`the abs of` *factor* `abs (`*expression*`)`	Absolute value
`annuity (`*rate, periods*`)`	Calculates an annuity
`the atan of` *factor* `atan (`*expression*`)`	Arc tangent—radians
`average (`*list*`)`	Calculates an average
`the charToNum of` *factor* `charToNum (`*expression*`)`	Returns the ASCII value of a character
`the clickH`	Gives horizontal coordinate of where the user last clicked
`the clickLoc` `clickLoc()`	Gives horizontal and vertical coordinates of where the user last clicked
`the clickV`	Gives vertical coordinate of where the user last clicked
`the commandKey` `commandKey()`	Condition of the Command key: `up` or `down`
`compound (`*rate, periods*`)`	Calculates compound interest
`the cos of` *factor* `cos (`*expression*`)`	Cosine—radians
`the [`*modifier*`] date`	Current date set in the Macintosh: long or short
`the diskSpace` `diskSpace()`	Amount of free space on the current disk
`the exp of` *factor* `exp (`*expression*`)`	Mathematical exponential
`the exp1 of` *factor* `exp1 (`*expression*`)`	1 less than mathematical exponential: `exp()-1`
`the exp2 of` *factor* `exp2 (`*expression*`)`	The value of 2 raised to the power of *factor*

`the foundText`	Returns characters found by the `find` command
`the foundChunk`	Returns a description of where the text is found
`the foundLine`	Tells which line the found text is in
`the foundField`	Tells which field the found text is in
`the length of` *factor* `length (`*expression*`)`	Number of characters in a text string
`the ln of` *factor* `ln (`*expression*`)`	Natural logarithm—base-*e*
`the ln1 of` *factor* `ln1 (`*expression*`)`	1 plus the natural logarithm: `ln(1+`*factor*`)`
`the log2 of` *factor* `log2 (`*expression*`)`	Base-2 logarithm
`max (`*list*`)`	Returns the highest number value of a list
`min (`*list*`)`	Returns the lowest number value of a list
`the mouse` `mouse()`	Condition of the mouse button: `up` or `down`
`the mouseClick` `mouseClick()`	Returns `true` if the mouse button is clicked
`the mouseH` `mouseH()`	Horizontal position of the pointer on the screen
`the mouseLoc` `mouseLoc()`	Horizontal and vertical coordinates of the pointer
`the mouseV` `mouseV()`	Vertical position of the pointer
`[the] number of` *objects*	Number of buttons/fields on current card or bg
`[the] number of` *chunks* `in` *factor*	Number of characters, words, lines, and so on in text string
`[the] number of cards of` *background*	Number of cards in specified background
`the numToChar of` *factor* `numToChar (`*expression*`)`	Returns the character corresponding to an ASCII value
`offset (`*string1*`,` *string2*`)`	Gives number of characters between the beginnings of two strings
`the optionKey` `optionKey()`	Condition of the Option key: `up` or `down`
`the param of` *factor* `param (`*expression*`)`	Returns the value of a parameter in a list
`the paramCount` `paramCount()`	The total number of parameters
`the params` `params()`	The entire list of parameters

`the random of` *factor* `random (`*expression*`)`	Gives a random integer from 1 to the value of *factor*
`the result` `result ()`	Returns a text string if `find` or `go` is unsuccessful
`the round of` *factor* `round (`*expression*`)`	Rounds to nearest integer: an odd integer plus 0.5 rounds up; an even integer, down
`the screenRect` `screenRect ()`	The rectangle of the screen in which the menu bar is displayed: left, top, right, bottom coordinates
`the seconds` `seconds ()`	Number of seconds between midnight January 1, 1904, and the current time in your Macintosh
`the selectedText`	Returns the text currently selected
`the selectedChunk`	Describes the location of the selected text
`the selectedLine`	Tells which line the selected text is in
`the selectedField`	Tells which field the selected text is in
`the shiftKey` `shiftKey ()`	Condition of the Shift key: `up` or `down`
`the sin of` *factor* `sin (`*expression*`)`	Sine—radians
`the sound` `sound ()`	Name of sound resource currently playing, or `"done"` if none is playing
`the sqrt of` *factor* `sqrt (`*expression*`)`	Square root of a positive number—a negative number gives the result `NAN(001)` meaning "not a number"
`the tan of` *factor* `tan (`*expression*`)`	Tangent—radians
`the target` `target ()`	Identifies the original recipient of a message
`the ticks` `ticks ()`	Number of ticks (⅙₀ second) since the Macintosh was turned on or restarted
`the [`*modifier*`] time` `time ()`	Gives time as a text string: long, short, abbreviated
`the tool` `tool ()`	Name of currently chosen tool
`the trunc of` *factor* `trunc (`*expression*`)`	The integer part of a number in *function*
`the value of` *factor* `value (`*expression*`)`	Gives the value of a string as an expression
`the [long] version [of HyperCard]` `version ()`	Returns the version number of HyperCard
`the version of` *stackDescriptor*	Tells version of HyperCard used to create, compact, change since compacted, and make latest changes, plus the date modified in seconds since January 1, 1904

Operator precedence

Order	Operators	Type of operator
1	`( )`	Grouping
2	`-`	Minus sign for numbers
	`not`	Logical negation for Boolean values
3	`^`	Exponentiation for numbers
4	`* / div mod`	Multiplication and division for numbers
5	`+ -`	Addition and subtraction for numbers
6	`& &&`	Concatenation of text
7	`> < <= >= ≤ ≥`	Comparison for numbers or text
	`is in contains`	Comparison for text
	`is not in`	Comparison for text
8	`= is is not <> ≠`	Comparison for numbers or text
9	`and`	Logical for Boolean values
10	`or`	Logical for Boolean values

The Apple Publishing System

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